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Osborne et al.

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(45) **Date of Patent: Jul. 26, 2011**

(54) **SYSTEM AND METHODS FOR FACILITATING A MULTIPARTY COMMUNICATIONS SESSION WITH A DYNAMICALLY DESIGNATED SESSION MANAGER**

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G06F 15/16 (2006.01)

(52) **U.S. Cl.** **709/206**

(58) **Field of Classification Search** 709/206
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,369,705	A		11/1994	Bird et al.
5,473,599	A	*	12/1995	Li et al. 370/219
5,634,011	A	*	5/1997	Auerbach et al. 709/242
5,862,329	A		1/1999	Aras et al.
5,867,653	A		2/1999	Aras et al.
5,991,385	A		11/1999	Dunn et al.
6,078,957	A	*	6/2000	Adelman et al. 709/224
6,151,621	A		11/2000	Colyer et al.
6,522,435	B1	*	2/2003	Chang et al. 398/49
6,973,023	B1	*	12/2005	Saleh et al. 370/217
7,177,951	B1	*	2/2007	Dykeman et al. 709/249
2001/0024433	A1	*	9/2001	Vanttinen 370/338
2002/0042693	A1	*	4/2002	Kampe et al. 702/186
2002/0052957	A1	*	5/2002	Shimada 709/225
2002/0156875	A1	*	10/2002	Pabla 709/220
2003/0008674	A1	*	1/2003	Cudak et al. 455/466
2003/0091027	A1		5/2003	Celi, Jr. et al.
2003/0091175	A1		5/2003	Celi, Jr. et al.
2003/0135565	A1	*	7/2003	Estrada 709/206
2004/0071099	A1	*	4/2004	Costa-Requena et al. 370/260
2004/0093433	A1	*	5/2004	Armbruster et al. 709/247
2004/0215614	A1	*	10/2004	Doyle et al. 707/8
2004/0225716	A1	*	11/2004	Shamir et al. 709/204

OTHER PUBLICATIONS

R. Sparks, "The SIP Refer Method" http://tools.ietf.org/html/draft-ietf-sip-refer-06, Jul. 17, 2002. pp. 1-21.*
Rhee et al. Group communication support for distributed collaboration systems. Cluster Computing 2 (1999) 3-16.*

(Continued)

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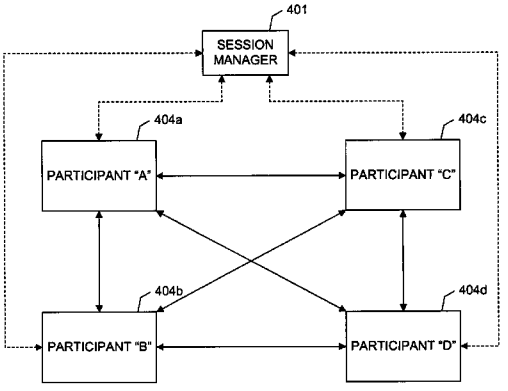
Assistant Examiner — John M Macilwinen
(74) *Attorney, Agent, or Firm* — Perkins Coie LLP

(57) **ABSTRACT**

A system and methods for facilitating multiparty communications sessions with a plurality of participants and for dynamically designating a communications session manager. More particularly, a system and methods, including protocols, for: establishing a multiparty communications session between a plurality of participants and their respective communication devices in a full-mesh topology; establishing a dynamically designated session manager uniquely associated with a first participant of the multiparty session and, hence, such participant's communication device; as necessary, adding and removing participants and their respective communication devices from the multiparty communications session; and, designating, or electing, another participant as session manager when the first participant exits the multiparty communications session. The methods also enable participants to maintain consistent lists of session participants and establish peer to peer communication links between the participants.

28 Claims, 21 Drawing Sheets



OTHER PUBLICATIONS

Fetzer and Crisitian. A Highly Available Local Leader Election Service. IEEE Transactions on Software Engineering. vol. 25. No. 5. Sep./Oct. 1999.*

Miladinovic and Stadler, "Optimization of signaling traffic in centralized conferences using SIP," in Proc. WSEAS ICOMIV 2002, 2nd WSEAS Int. Conf. Multimedia, Internet, and Video, Skiathos Island, Greece, Sep. 2002, pp. 1-6.*

Schulzrinne and Rosenberg, "Signaling for Internet telephony", Proc. ICNP '98, Austin, TX, Oct. 1998. pp. 1-10.*

* cited by examiner

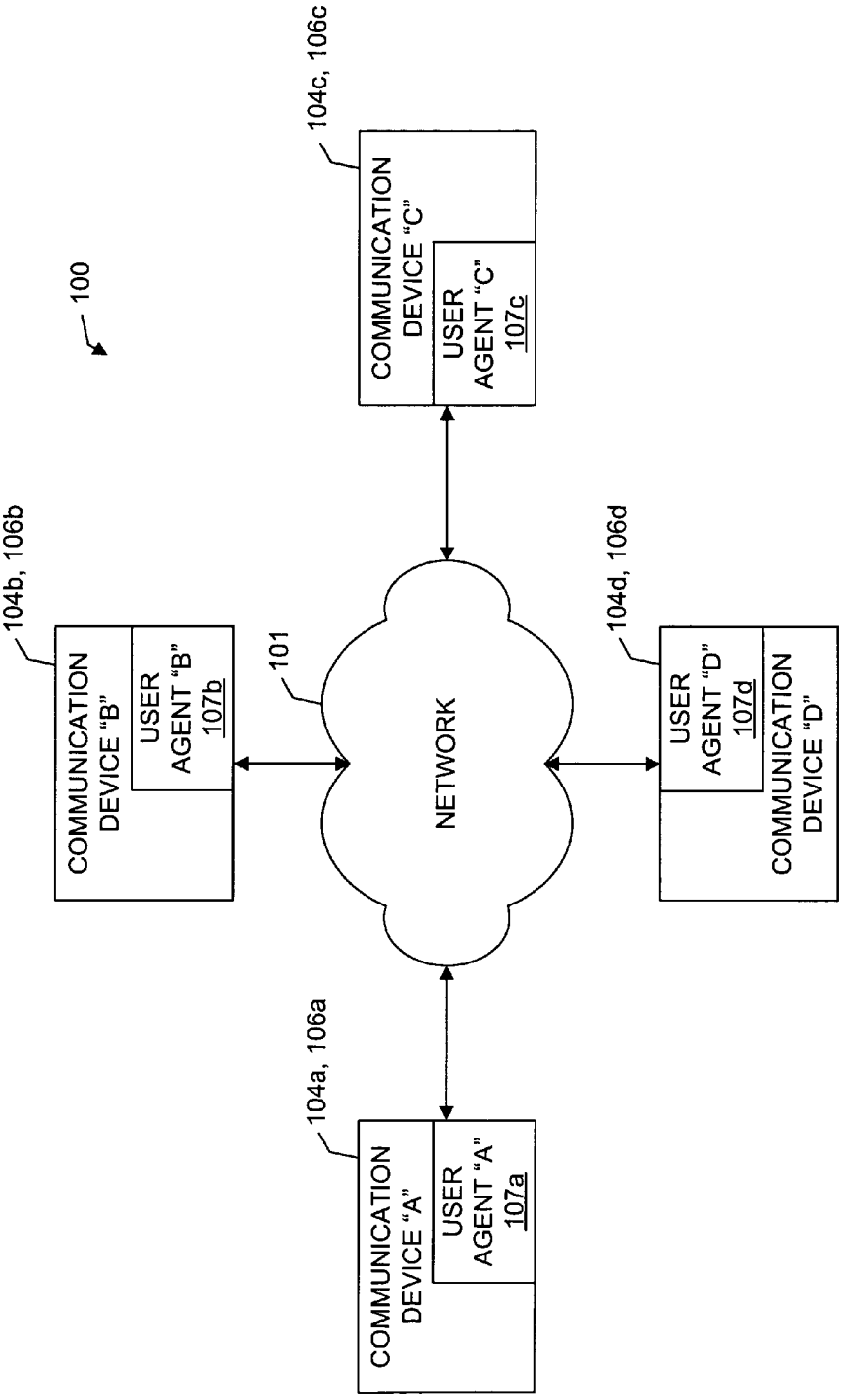

100
104c, 106c
COMMUNICATION DEVICE "C"
USER AGENT "C" 107c
104b, 106b
COMMUNICATION DEVICE "B"
USER AGENT "B" 107b
101
NETWORK
104d, 106d
USER AGENT "D" 107d
COMMUNICATION DEVICE "D"
104a, 106a
COMMUNICATION DEVICE "A"
USER AGENT "A" 107a

FIG. 1

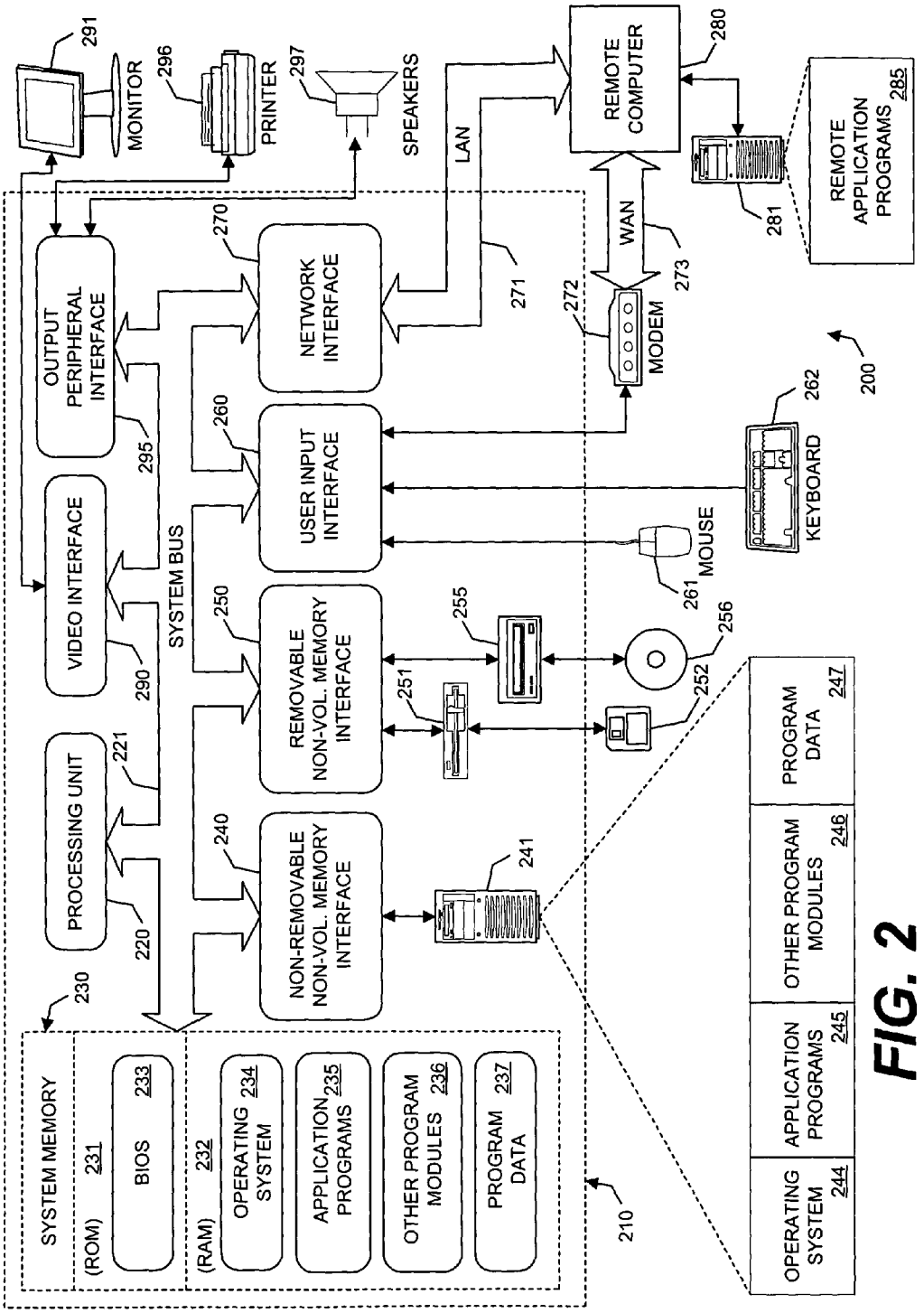

SYSTEM MEMORY
(ROM) 231
BIOS 233
(RAM) 232
OPERATING SYSTEM 234
APPLICATION PROGRAMS 235
OTHER PROGRAM MODULES 236
PROGRAM DATA 237
230
PROCESSING UNIT
220
221
VIDEO INTERFACE
290
OUTPUT PERIPHERAL INTERFACE
295
NON-REMOVABLE NON-VOL. MEMORY INTERFACE
240
REMOVABLE NON-VOL. MEMORY INTERFACE
250
USER INPUT INTERFACE
260
NETWORK INTERFACE
270
SYSTEM BUS
MONITOR
291
PRINTER
296
SPEAKERS
297
LAN
271
REMOTE COMPUTER
280
WAN
273
MODEM
272
REMOTE APPLICATION PROGRAMS
285
281
KEYBOARD
262
MOUSE
261
241
251
255
252
256
200
210
OPERATING SYSTEM 244
APPLICATION PROGRAMS 245
OTHER PROGRAM MODULES 246
PROGRAM DATA 247

FIG. 2

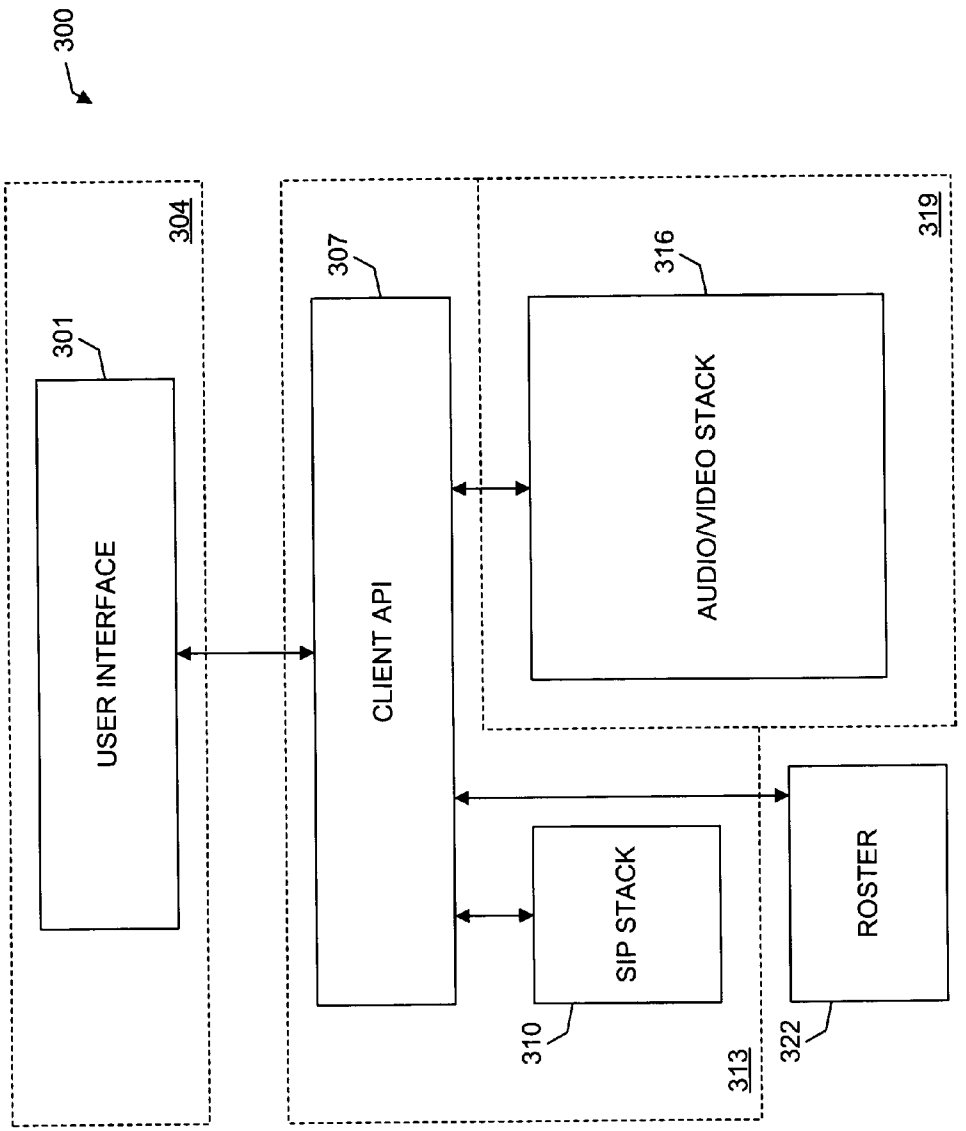

300
304
301
USER INTERFACE
307
CLIENT API
316
AUDIO/VIDEO STACK
319
SIP STACK
310
ROSTER
322
313

FIG. 3

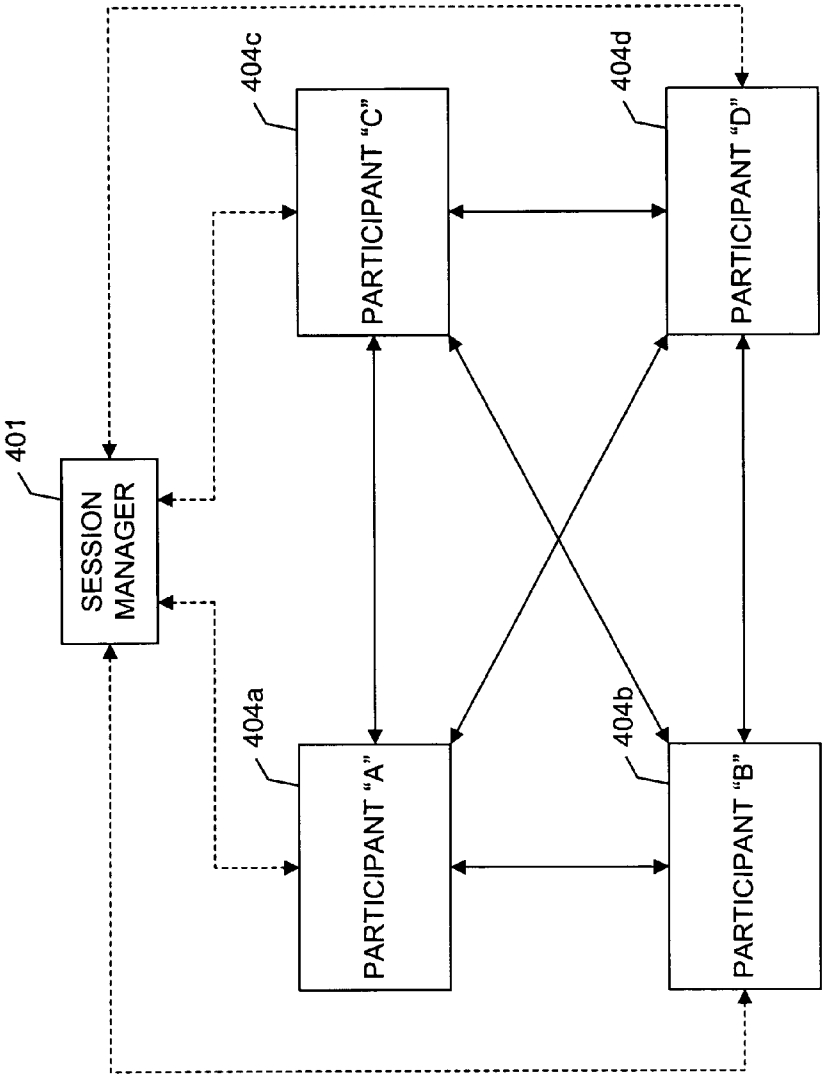

401
SESSION MANAGER
404a
PARTICIPANT "A"
404b
PARTICIPANT "B"
404c
PARTICIPANT "C"
404d
PARTICIPANT "D"

FIG. 4

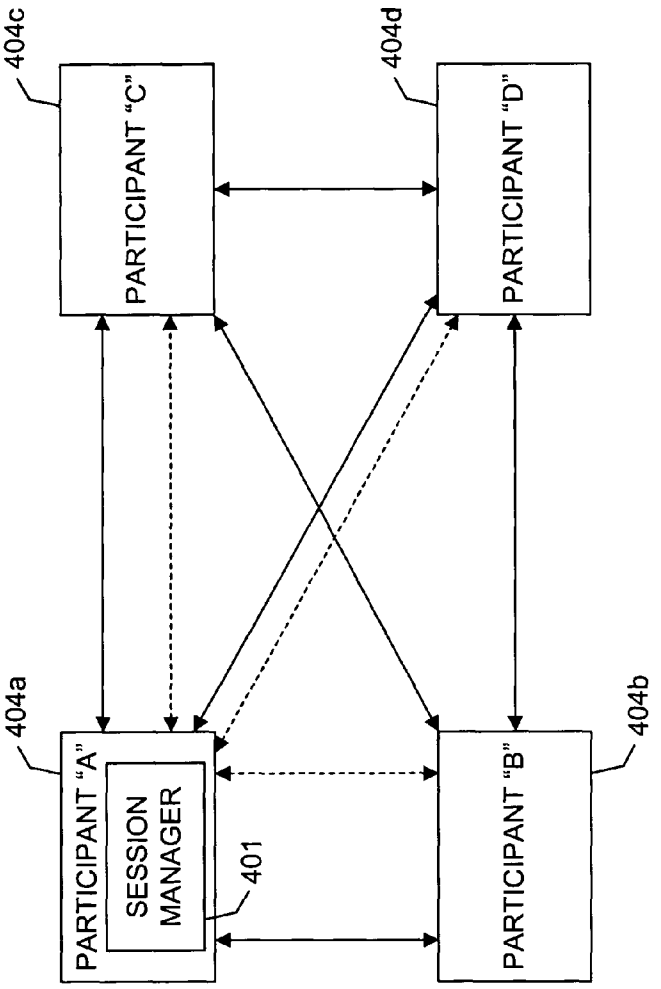

404c
PARTICIPANT "C"
404d
PARTICIPANT "D"
404a
PARTICIPANT "A"
SESSION MANAGER
401
PARTICIPANT "B"
404b

FIG. 5

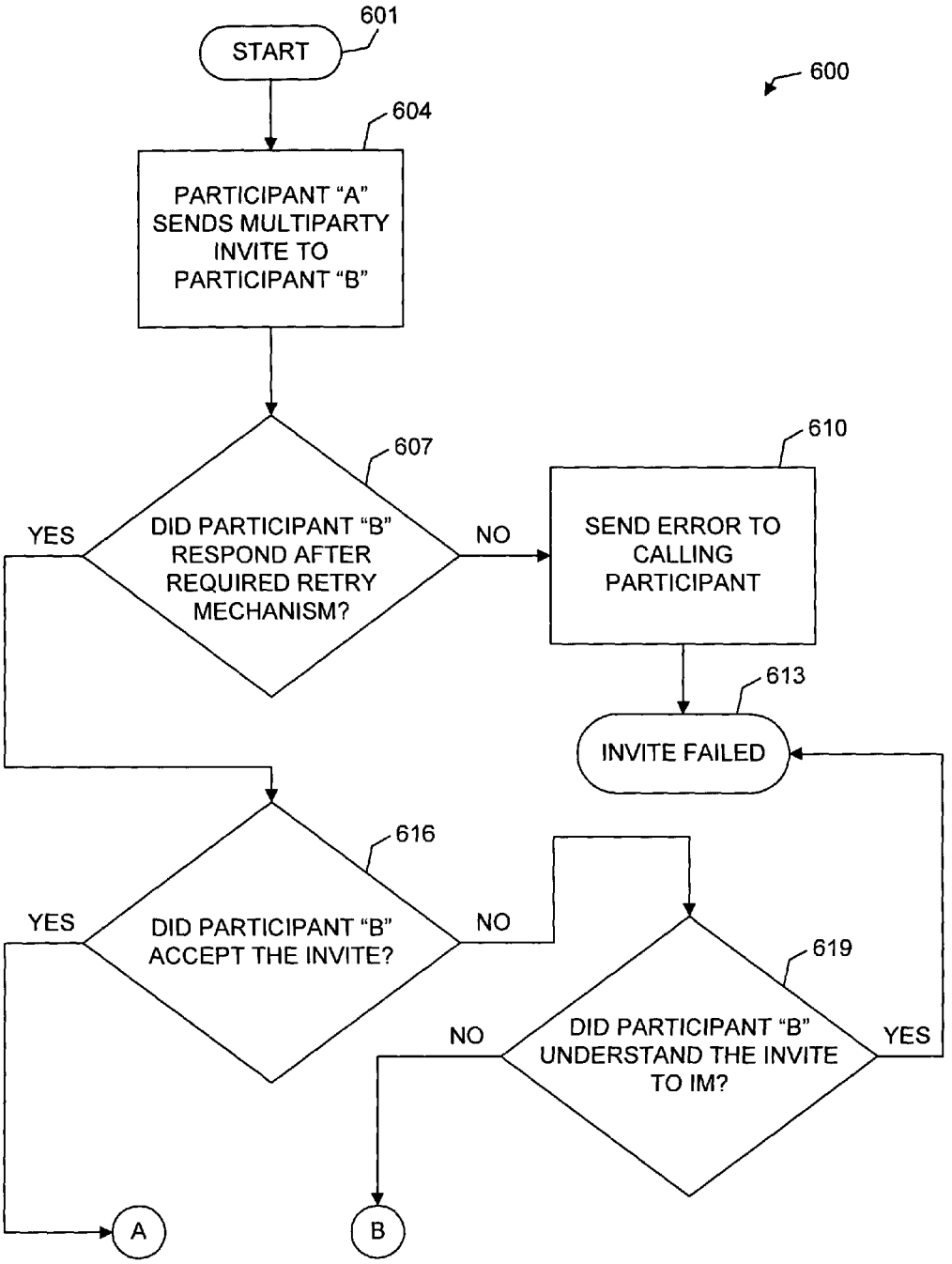

601
START
600
604
PARTICIPANT "A" SENDS MULTIPARTY INVITE TO PARTICIPANT "B"
607
DID PARTICIPANT "B" RESPOND AFTER REQUIRED RETRY MECHANISM?
YES
NO
610
SEND ERROR TO CALLING PARTICIPANT
613
INVITE FAILED
616
DID PARTICIPANT "B" ACCEPT THE INVITE?
YES
NO
619
DID PARTICIPANT "B" UNDERSTAND THE INVITE TO IM?
NO
YES
A
B

FIG. 6A

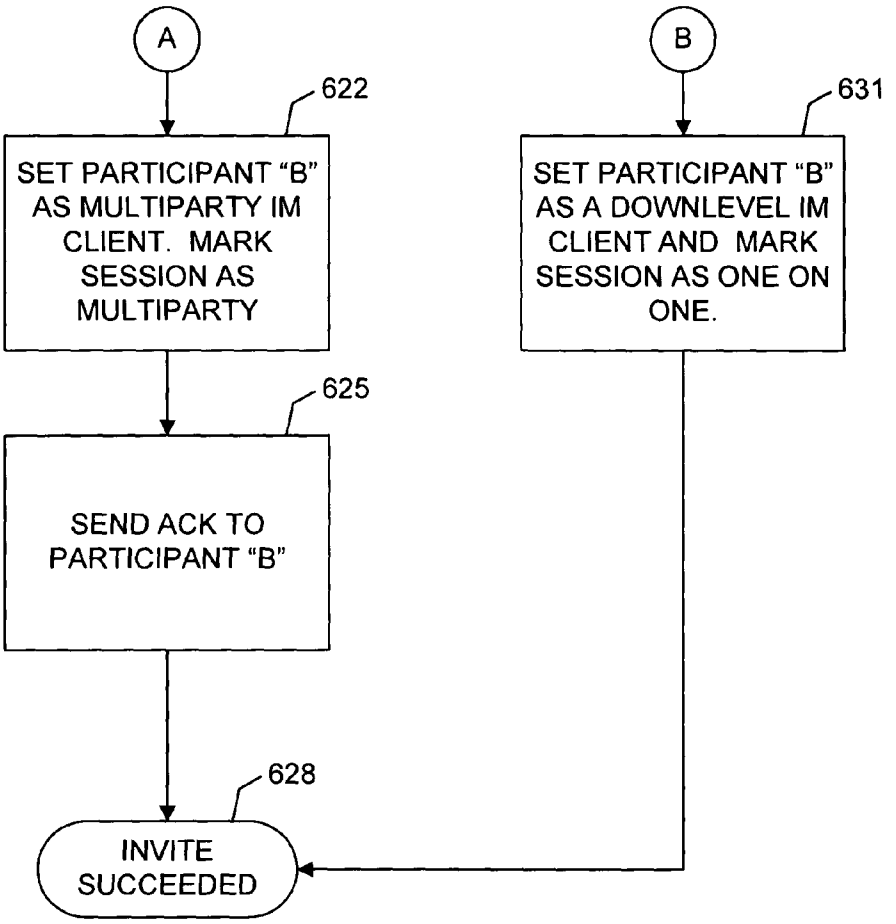

A
B
622
631
SET PARTICIPANT "B" AS MULTIPARTY IM CLIENT. MARK SESSION AS MULTIPARTY
SET PARTICIPANT "B" AS A DOWNLEVEL IM CLIENT AND MARK SESSION AS ONE ON ONE.
625
SEND ACK TO PARTICIPANT "B"
628
INVITE SUCCEEDED

FIG. 6B

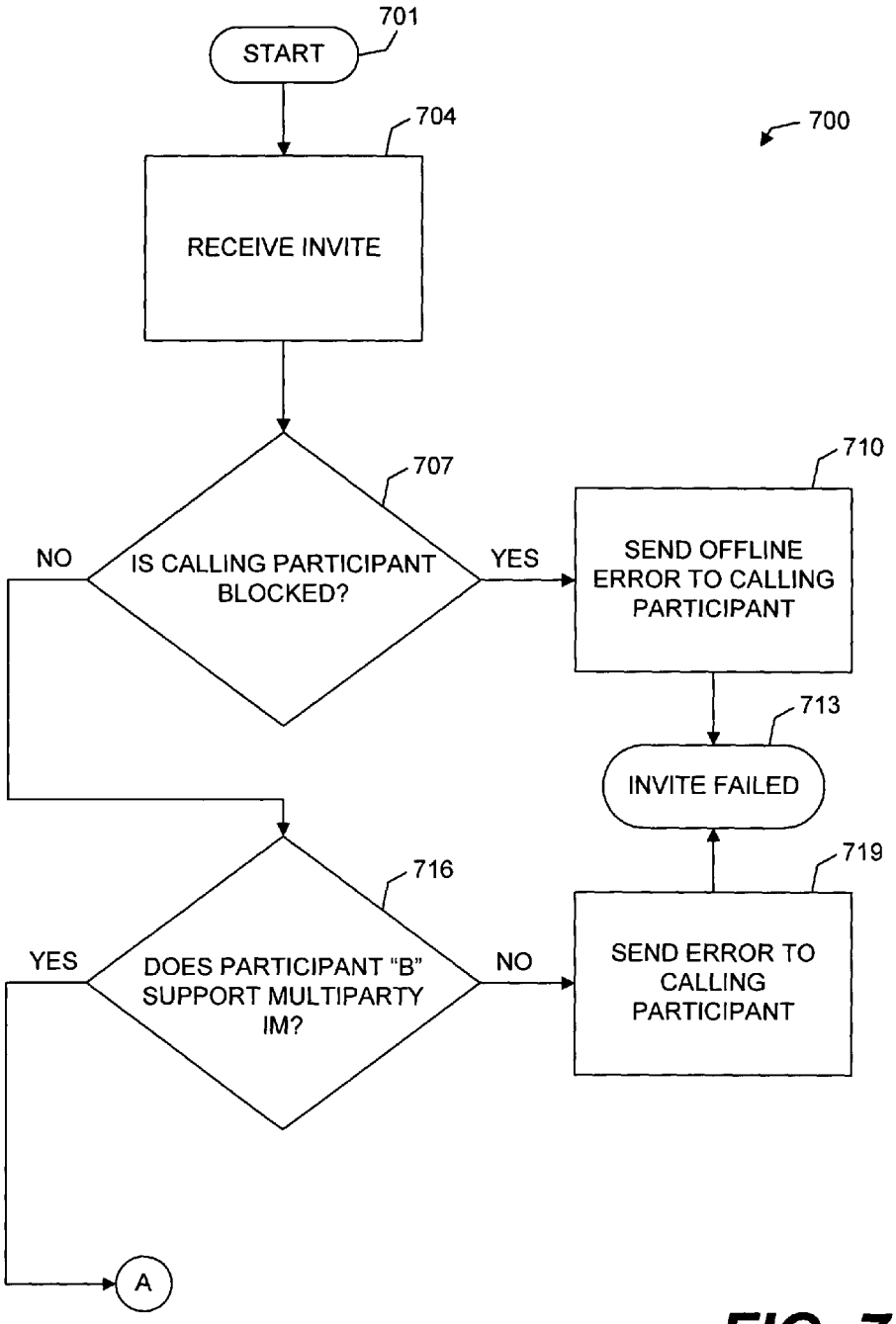

701
START
704
RECEIVE INVITE
700
707
IS CALLING PARTICIPANT BLOCKED?
NO
YES
710
SEND OFFLINE ERROR TO CALLING PARTICIPANT
713
INVITE FAILED
716
DOES PARTICIPANT "B" SUPPORT MULTIPARTY IM?
YES
NO
719
SEND ERROR TO CALLING PARTICIPANT
A

FIG. 7A

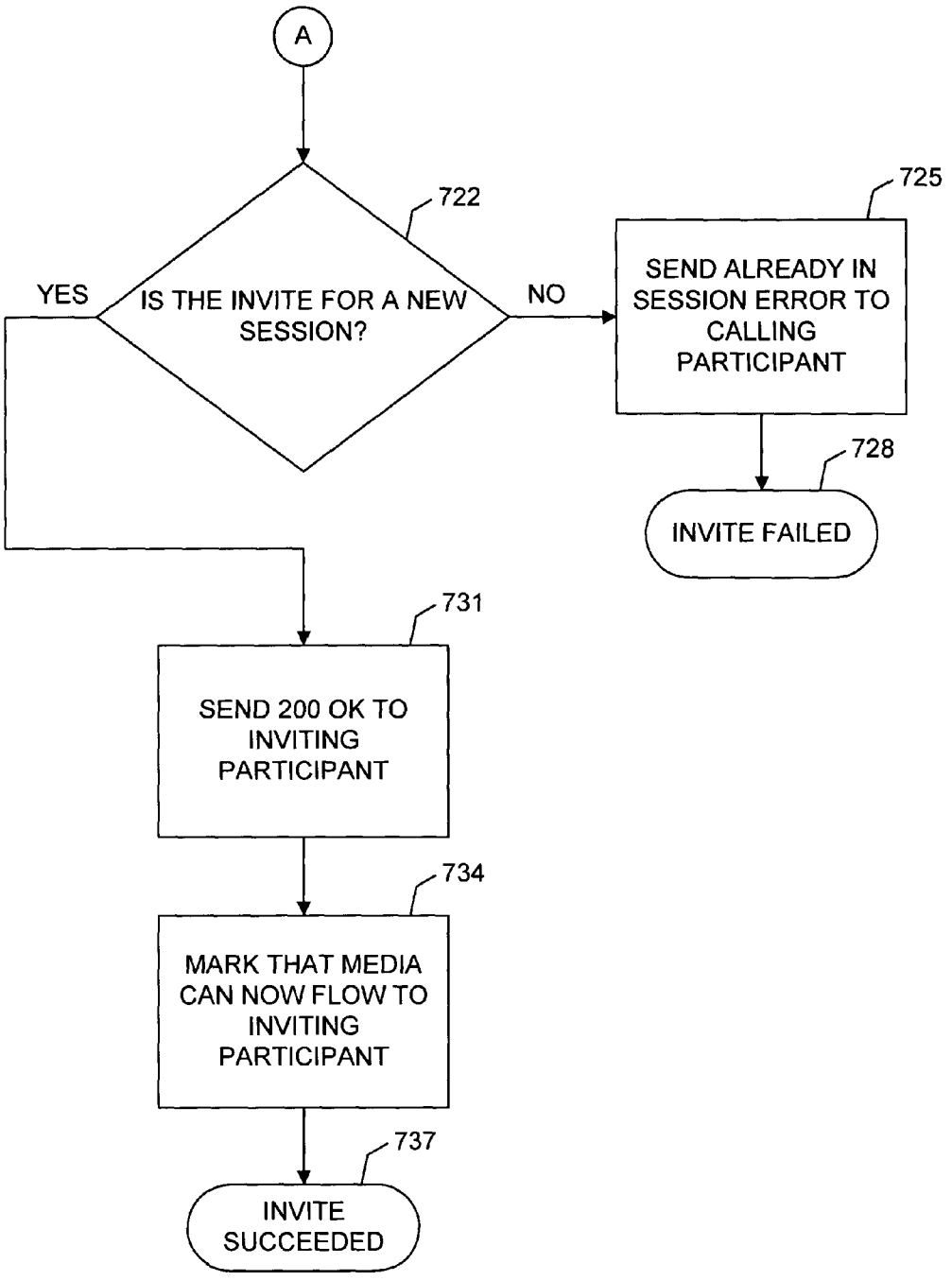

A
722
IS THE INVITE FOR A NEW SESSION?
YES
NO
725
SEND ALREADY IN SESSION ERROR TO CALLING PARTICIPANT
728
INVITE FAILED
731
SEND 200 OK TO INVITING PARTICIPANT
734
MARK THAT MEDIA CAN NOW FLOW TO INVITING PARTICIPANT
737
INVITE SUCCEEDED

FIG. 7B

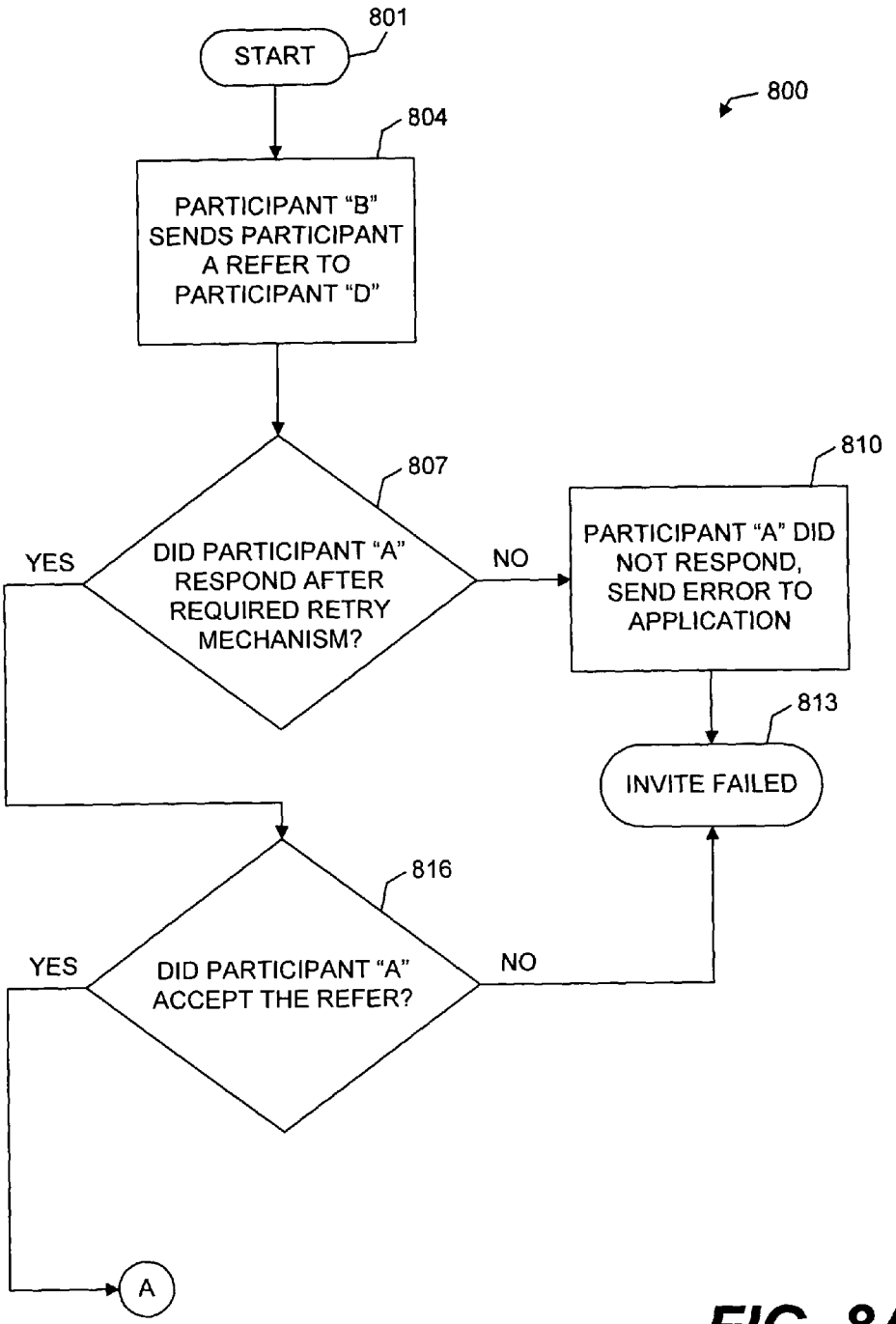

801
START
800
804
PARTICIPANT "B" SENDS PARTICIPANT A REFER TO PARTICIPANT "D"
807
DID PARTICIPANT "A" RESPOND AFTER REQUIRED RETRY MECHANISM?
YES
NO
810
PARTICIPANT "A" DID NOT RESPOND, SEND ERROR TO APPLICATION
813
INVITE FAILED
816
DID PARTICIPANT "A" ACCEPT THE REFER?
YES
NO
A

FIG. 8A

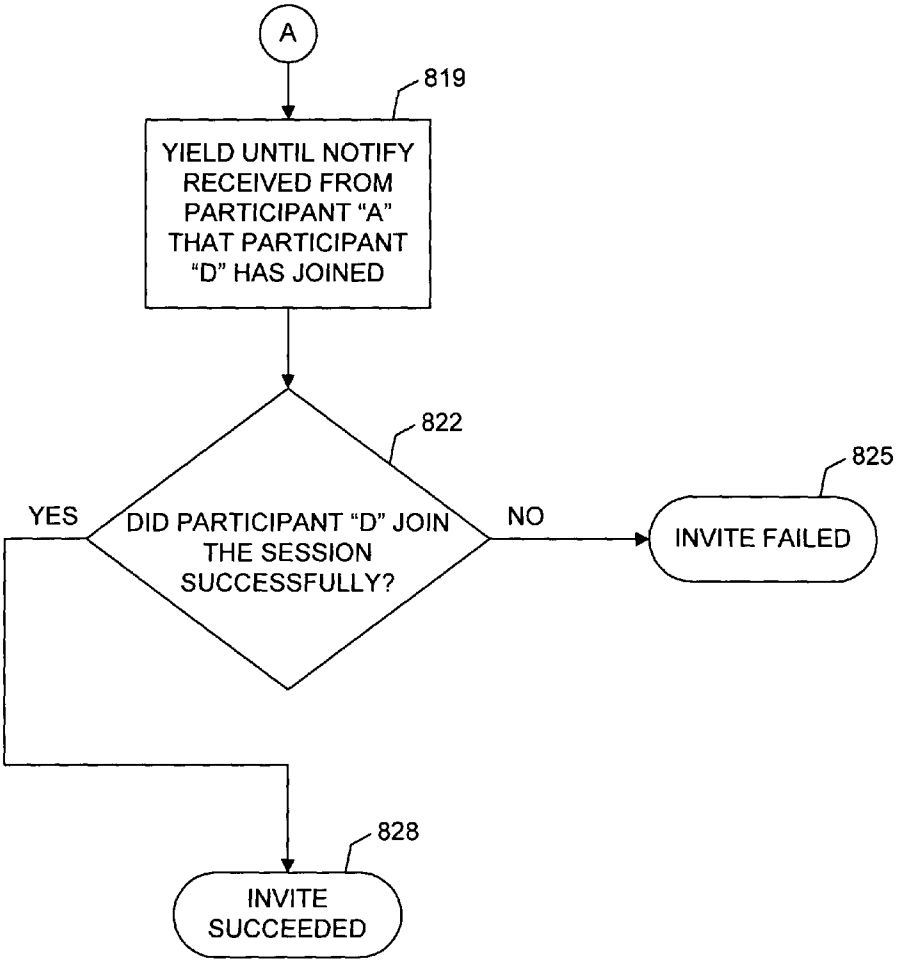

A
819
YIELD UNTIL NOTIFY RECEIVED FROM PARTICIPANT "A" THAT PARTICIPANT "D" HAS JOINED
822
DID PARTICIPANT "D" JOIN THE SESSION SUCCESSFULLY?
YES
NO
825
INVITE FAILED
828
INVITE SUCCEEDED

FIG. 8B

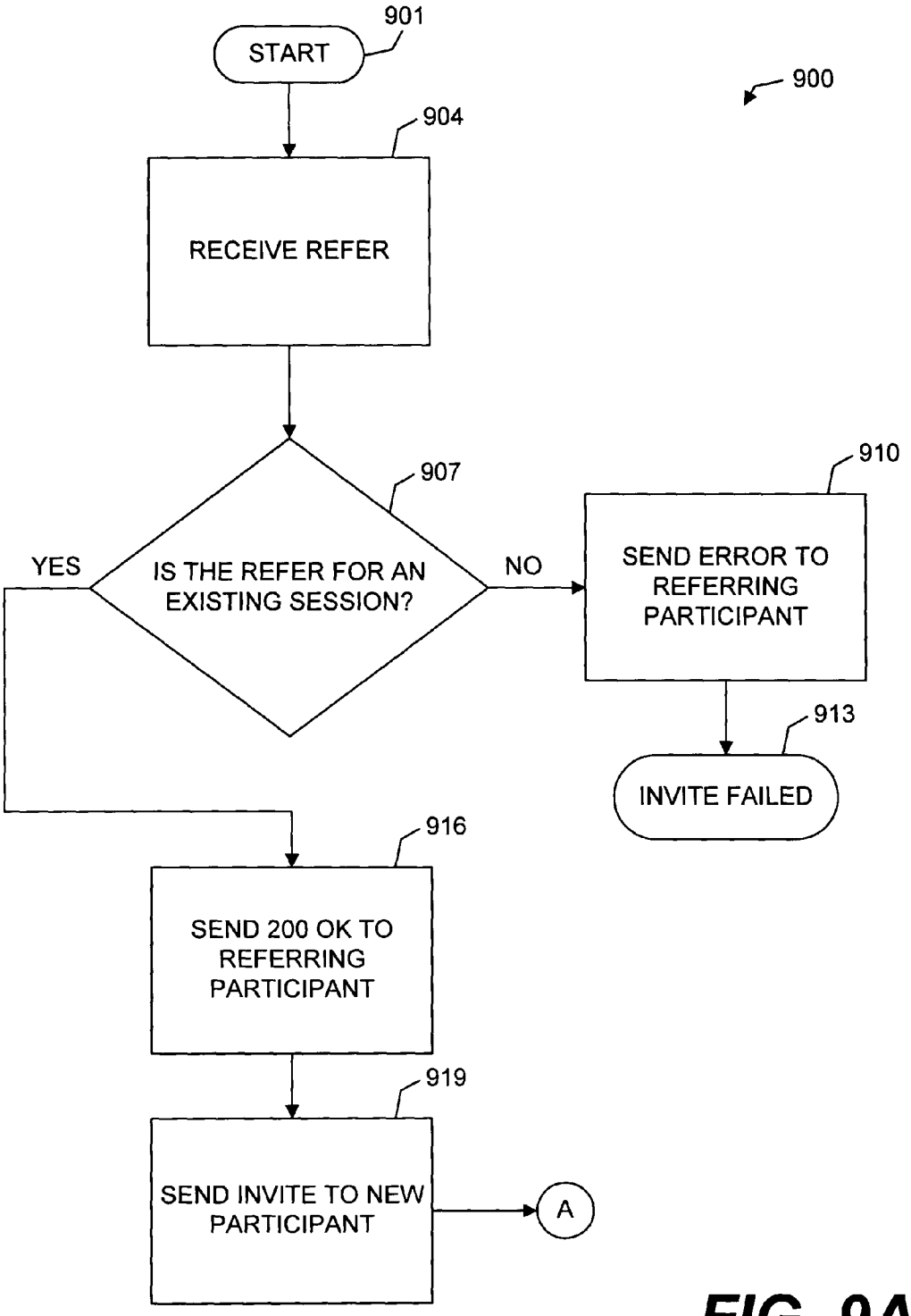

901
START
900
904
RECEIVE REFER
907
IS THE REFER FOR AN EXISTING SESSION?
YES
NO
910
SEND ERROR TO REFERRING PARTICIPANT
913
INVITE FAILED
916
SEND 200 OK TO REFERRING PARTICIPANT
919
SEND INVITE TO NEW PARTICIPANT
A

FIG. 9A

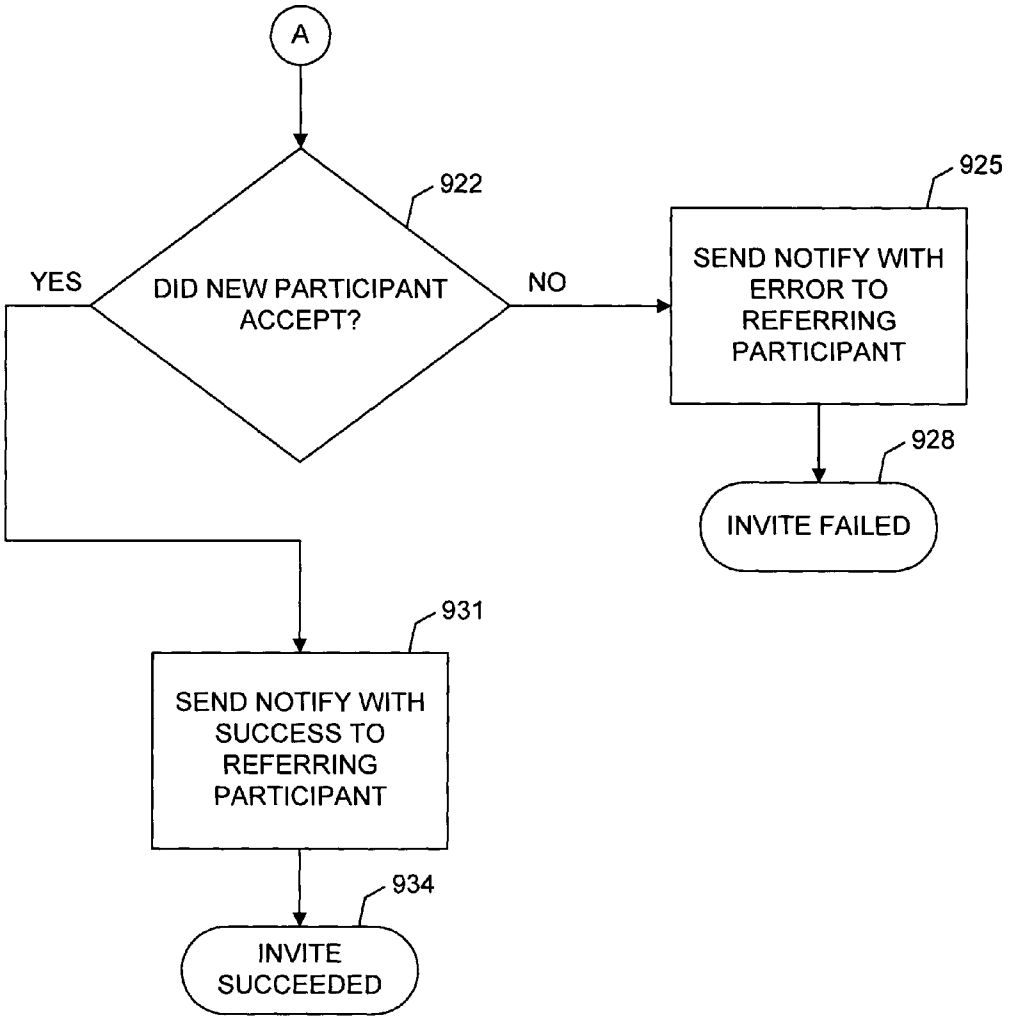

A
922
DID NEW PARTICIPANT ACCEPT?
YES
NO
925
SEND NOTIFY WITH ERROR TO REFERRING PARTICIPANT
928
INVITE FAILED
931
SEND NOTIFY WITH SUCCESS TO REFERRING PARTICIPANT
934
INVITE SUCCEEDED

FIG. 9B

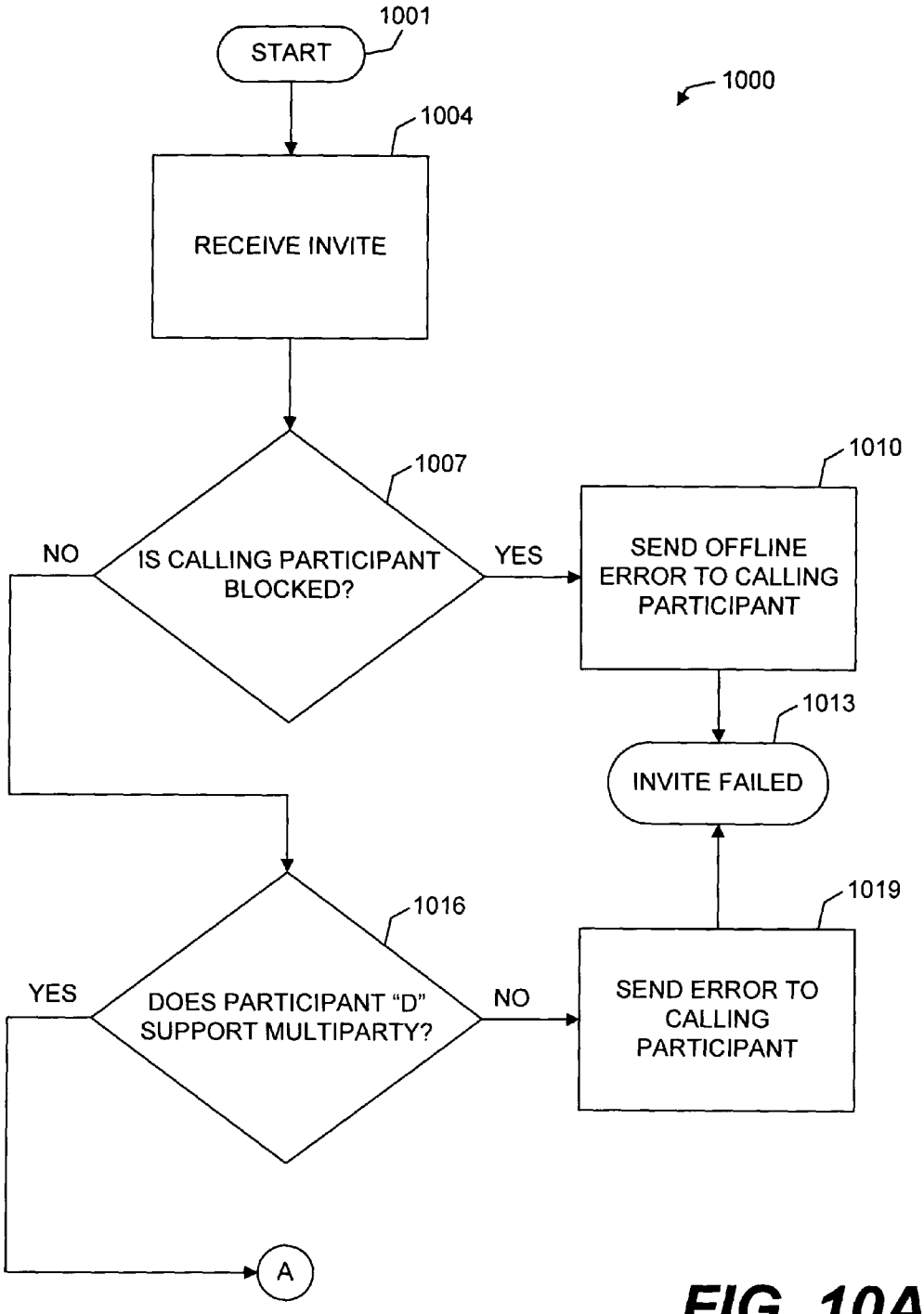

1001
START
1000
1004
RECEIVE INVITE
1007
IS CALLING PARTICIPANT BLOCKED?
NO
YES
1010
SEND OFFLINE ERROR TO CALLING PARTICIPANT
1013
INVITE FAILED
1016
DOES PARTICIPANT "D" SUPPORT MULTIPARTY?
YES
NO
1019
SEND ERROR TO CALLING PARTICIPANT
A

FIG. 10A

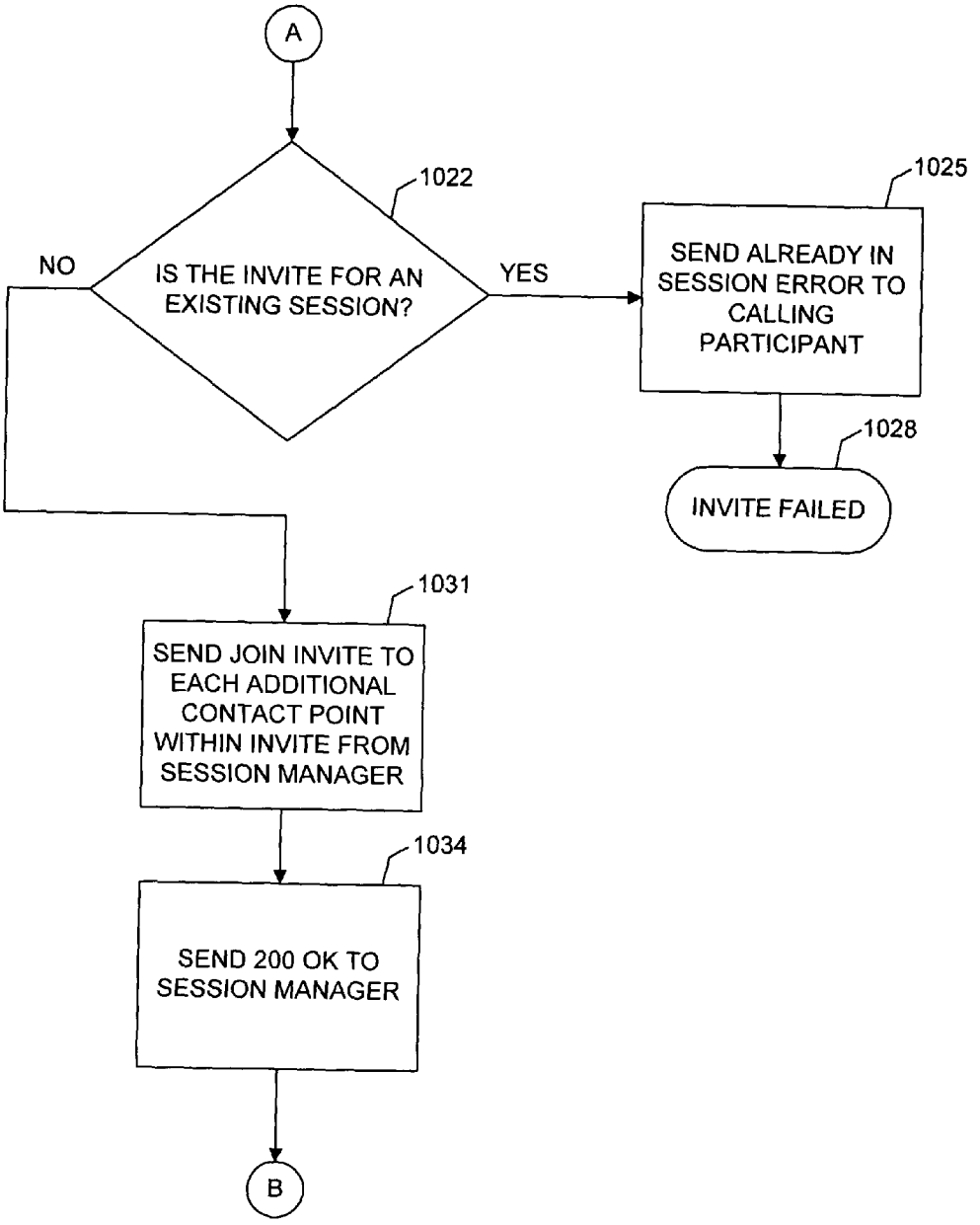

A
1022
IS THE INVITE FOR AN EXISTING SESSION?
NO
YES
1025
SEND ALREADY IN SESSION ERROR TO CALLING PARTICIPANT
1028
INVITE FAILED
1031
SEND JOIN INVITE TO EACH ADDITIONAL CONTACT POINT WITHIN INVITE FROM SESSION MANAGER
1034
SEND 200 OK TO SESSION MANAGER
B

FIG. 10B

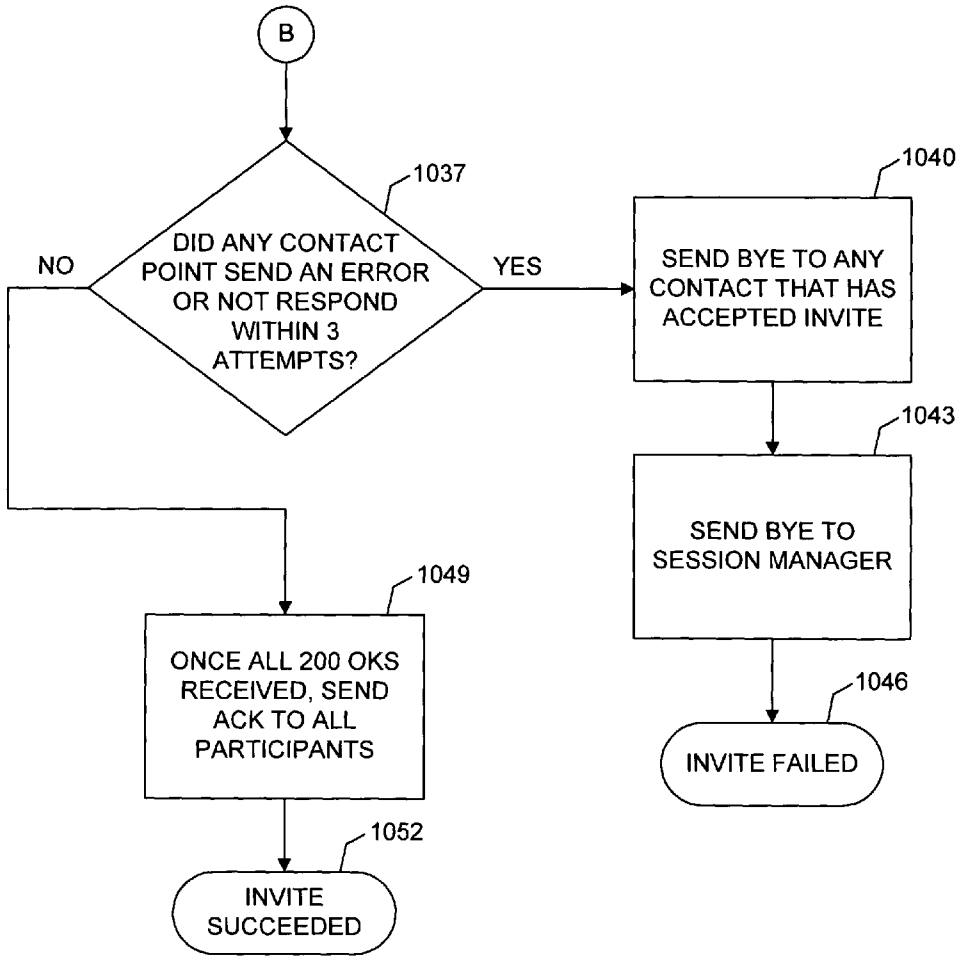

B
1037
DID ANY CONTACT POINT SEND AN ERROR OR NOT RESPOND WITHIN 3 ATTEMPTS?
NO
YES
1040
SEND BYE TO ANY CONTACT THAT HAS ACCEPTED INVITE
1043
SEND BYE TO SESSION MANAGER
1046
INVITE FAILED
1049
ONCE ALL 200 OKS RECEIVED, SEND ACK TO ALL PARTICIPANTS
1052
INVITE SUCCEEDED

FIG. 10C

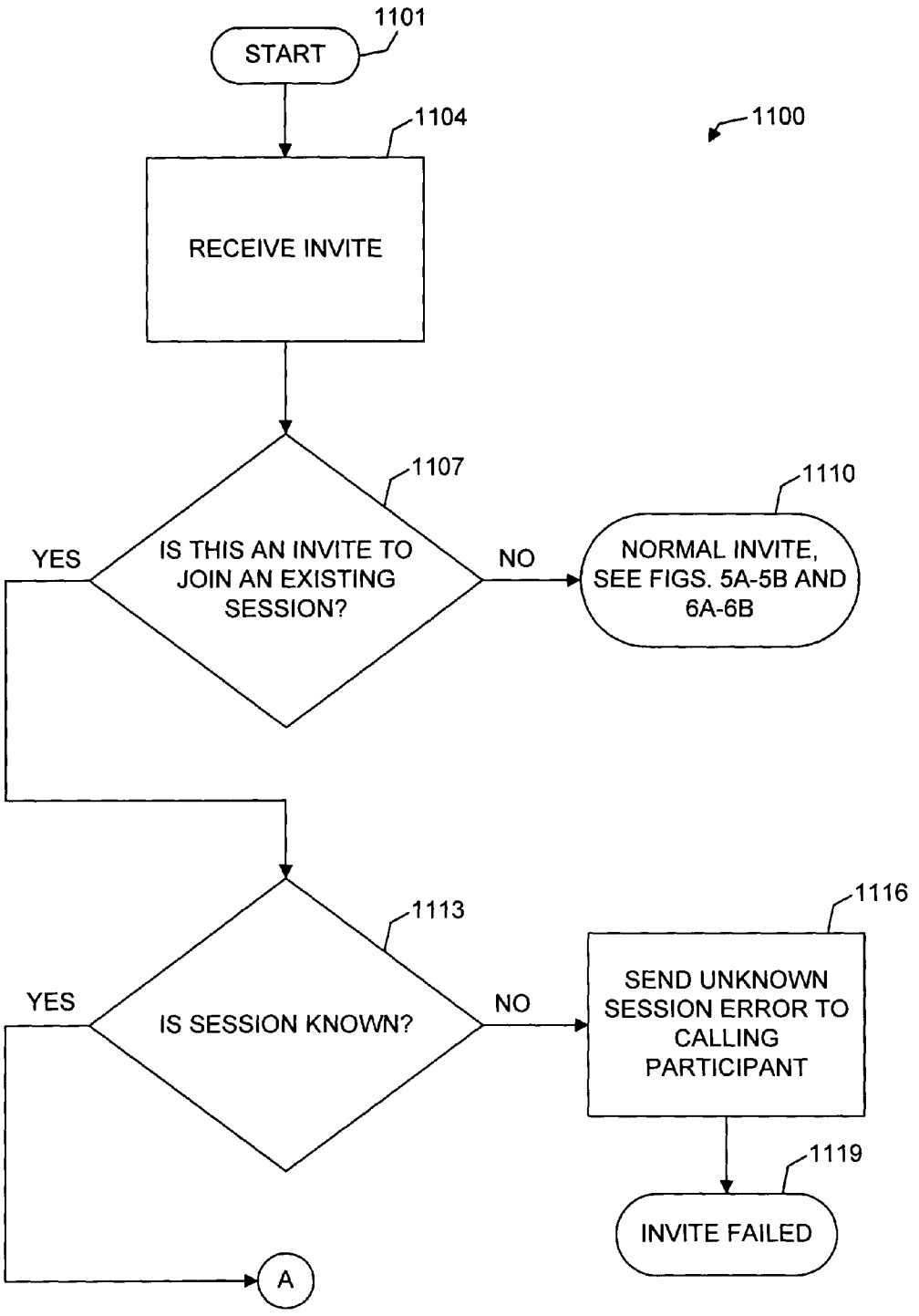

1101
START
1104
1100
RECEIVE INVITE
1107
IS THIS AN INVITE TO JOIN AN EXISTING SESSION?
YES
NO
1110
NORMAL INVITE, SEE FIGS. 5A-5B AND 6A-6B
1113
IS SESSION KNOWN?
YES
NO
1116
SEND UNKNOWN SESSION ERROR TO CALLING PARTICIPANT
1119
INVITE FAILED
A

FIG. 11A

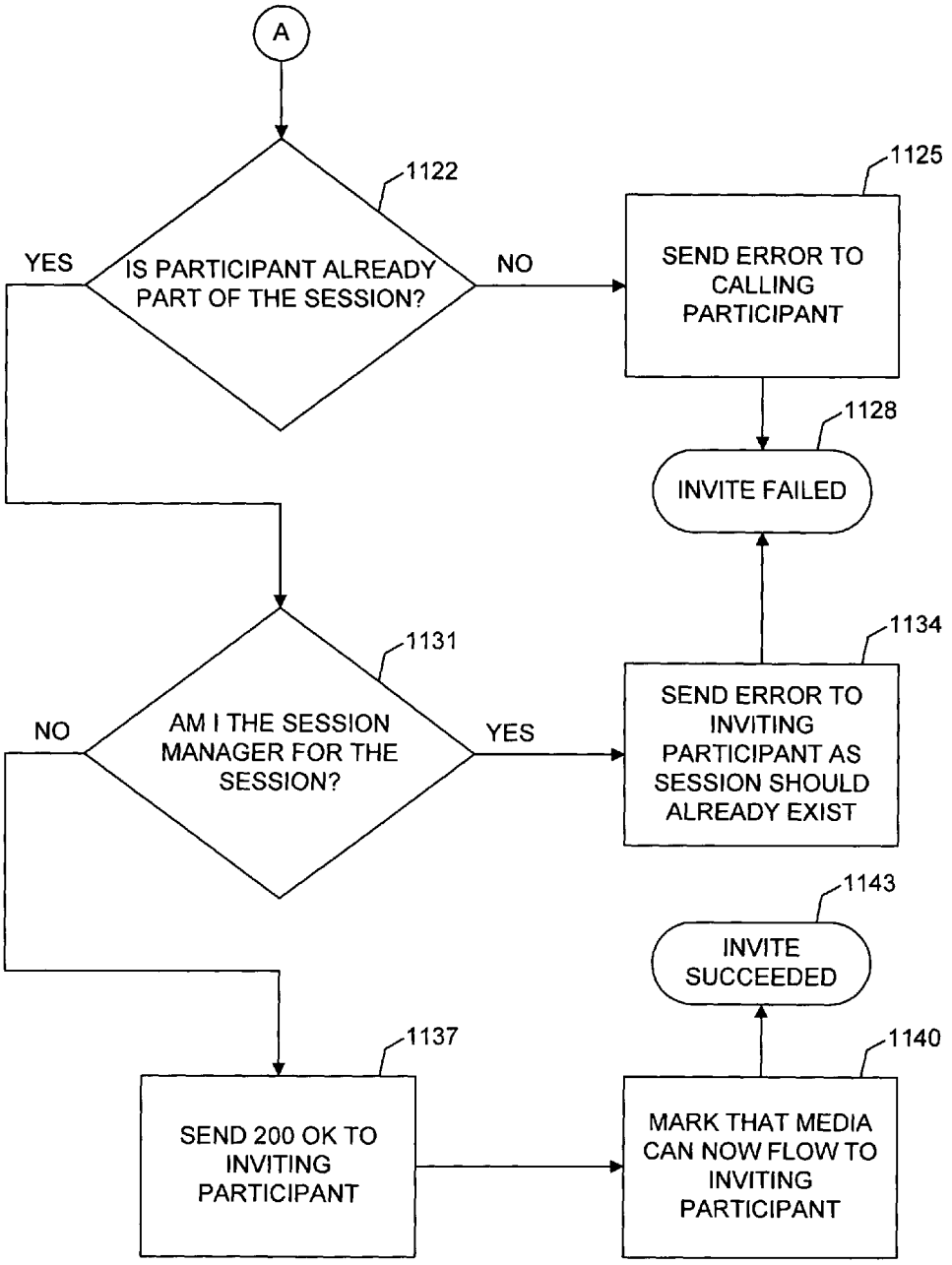

A
1122
IS PARTICIPANT ALREADY PART OF THE SESSION?
YES
NO
1125
SEND ERROR TO CALLING PARTICIPANT
1128
INVITE FAILED
1131
AM I THE SESSION MANAGER FOR THE SESSION?
NO
YES
1134
SEND ERROR TO INVITING PARTICIPANT AS SESSION SHOULD ALREADY EXIST
1143
INVITE SUCCEEDED
1137
SEND 200 OK TO INVITING PARTICIPANT
1140
MARK THAT MEDIA CAN NOW FLOW TO INVITING PARTICIPANT

FIG. 11B

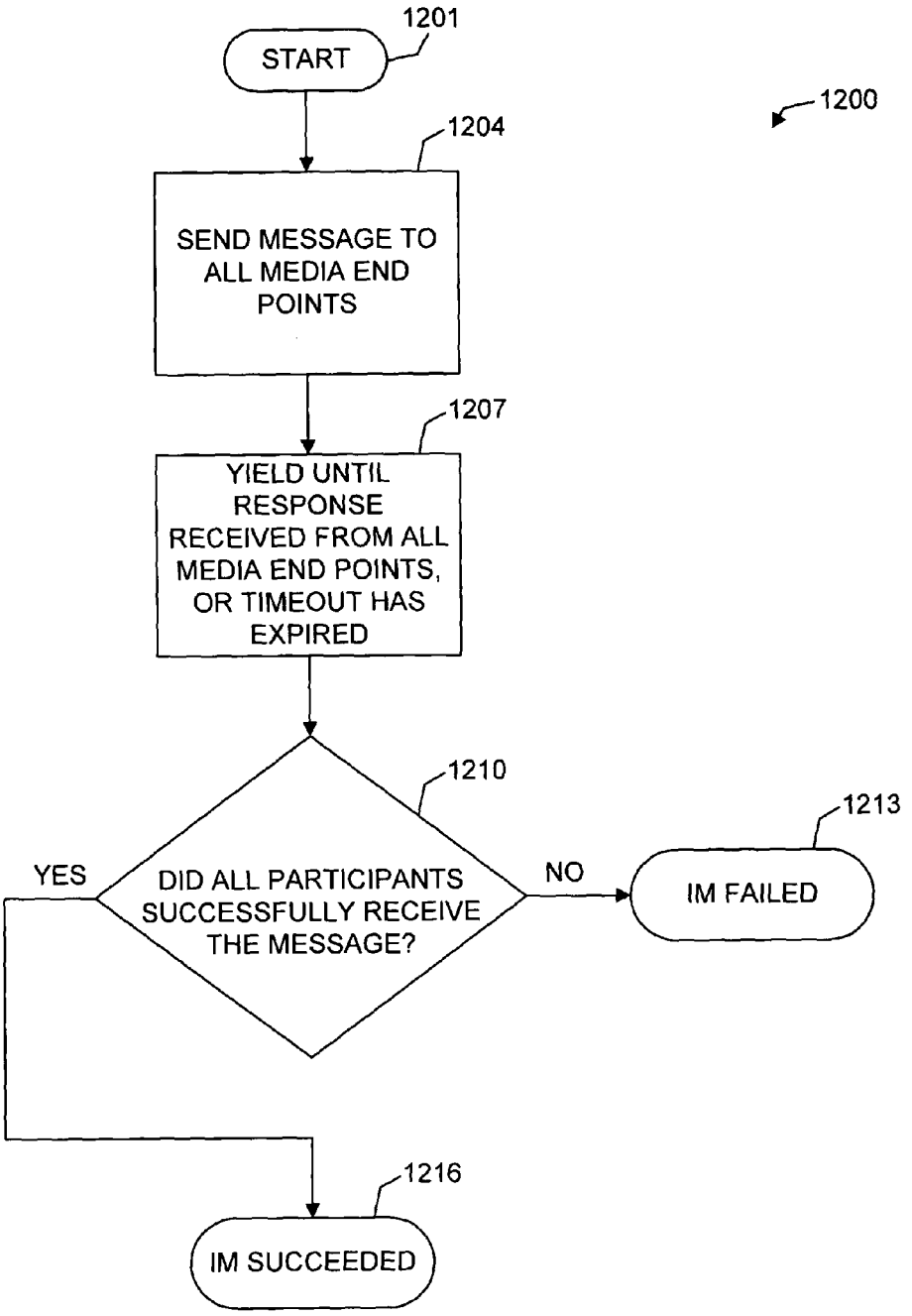

1201
START
1200
1204
SEND MESSAGE TO ALL MEDIA END POINTS
1207
YIELD UNTIL RESPONSE RECEIVED FROM ALL MEDIA END POINTS, OR TIMEOUT HAS EXPIRED
1210
DID ALL PARTICIPANTS SUCCESSFULLY RECEIVE THE MESSAGE?
YES
NO
1213
IM FAILED
1216
IM SUCCEEDED

FIG. 12

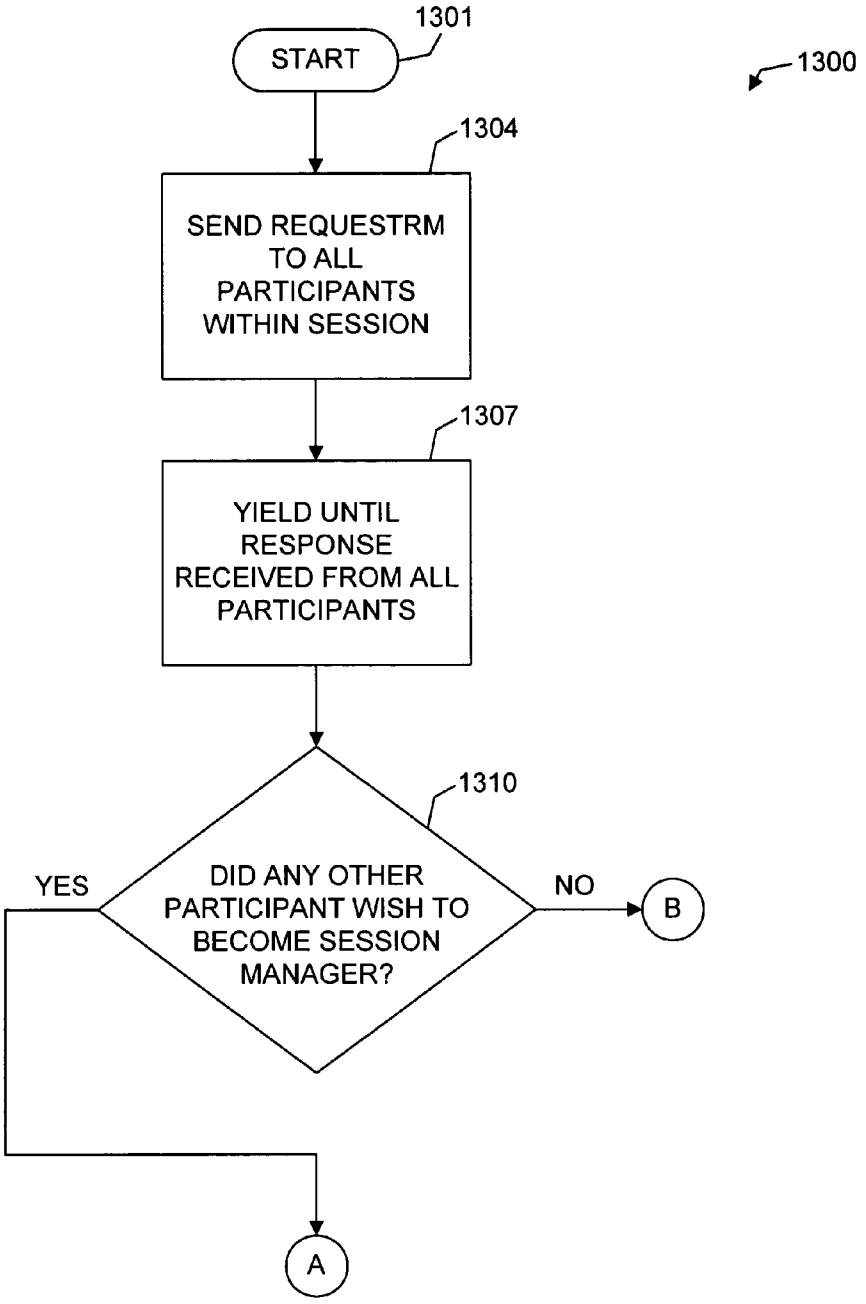

1301
START
1300
1304
SEND REQUESTRM TO ALL PARTICIPANTS WITHIN SESSION
1307
YIELD UNTIL RESPONSE RECEIVED FROM ALL PARTICIPANTS
1310
DID ANY OTHER PARTICIPANT WISH TO BECOME SESSION MANAGER?
YES
NO
B
A

FIG. 13A

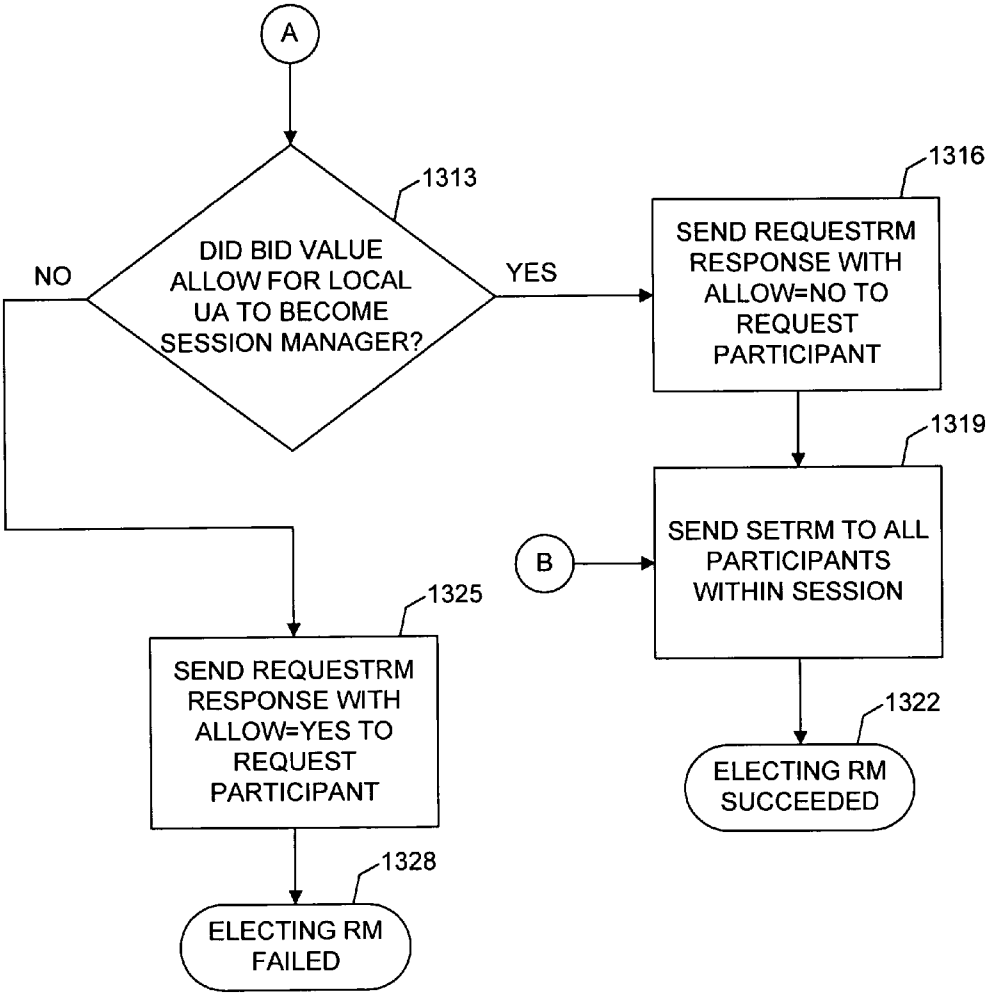

A
1313
DID BID VALUE ALLOW FOR LOCAL UA TO BECOME SESSION MANAGER?
NO
YES
1316
SEND REQUESTRM RESPONSE WITH ALLOW=NO TO REQUEST PARTICIPANT
1319
SEND SETRM TO ALL PARTICIPANTS WITHIN SESSION
B
1322
ELECTING RM SUCCEEDED
1325
SEND REQUESTRM RESPONSE WITH ALLOW=YES TO REQUEST PARTICIPANT
1328
ELECTING RM FAILED

FIG. 13B

SYSTEM AND METHODS FOR FACILITATING A MULTIPARTY COMMUNICATIONS SESSION WITH A DYNAMICALLY DESIGNATED SESSION MANAGER

TECHNICAL FIELD

The present invention relates, generally, to multiparty communications systems and methods, and, more particularly, to multiparty communications systems and methods with a dynamically designated communications session manager.

BACKGROUND OF THE INVENTION

Multiparty communications systems that permit communication between multiple participants are becoming increasingly popular, particularly within the Internet architecture. Originally, communications applications permitted communication between only two participants. Such one-on-one communication required little management because, with only two participants, a system for managing participants within a communications session was unnecessary. If one participant lost its connection to the communications session, then the other participant's connection was also lost.

A communications session involving more than two participants (i.e., a "multiparty communications session" or a "multiparty session") introduces potential requirements which must be addressed by participant management. First, when a participant loses a connection in a multiparty session, the other participants should not lose their connections to each other. Second, already existing multiparty sessions must provide a mechanism for joining new participants and enabling current participants to exit the multiparty session. Third, with participants leaving and joining multiparty communications sessions, it is necessary to maintain an updated participant list, or roster, so that current participants of the multiparty session know who is connected to the multiparty session. The maintaining of an updated participant list, or roster, also assists in managing peer to peer communication channels between participants.

One method of participant management involves the use of a designated communications server, also known as a central server. In such a method, every participant wanting to join a multiparty communications session contacts the designated communications server. The designated communications server establishes a connection with each such participant and also maintains a list of current participants. Then, each joining participant accesses the list residing on the designated communications server to determine the identities of the other participants already a part of the communications session. When a participant leaves the communications session, the list of participants located at the designated communications server is updated accordingly. Unfortunately, the use of a designated communications server for ensuring synchronization of the list of participants can be costly for the consumer. Further, if the designated communications server crashes or goes offline, then the entire multiparty communications session is lost.

As is known in the art, a multiparty communications session may exist without a dedicated communications server. By having direct connections between participants, there is no need for such a central server to manage connections or a list of participants because each participant knows who is connected to the multiparty session and knows how to establish communications with the other connected participants. For example, in a multiparty session, Participant A knows

who is connected to the multiparty session because every other participant within the multiparty session is directly connected to Participant A. While such a communications session eliminates the need for a dedicated communications server, certain disadvantages with such a communications session may exist. One common disadvantage manifests itself when a participant is trying to connect to an already existing multiparty session. For example, if a multiparty communications session already exists between Participant A, Participant B, and Participant C, then for Participant D to join the multiparty session individual connections must be made from Participant D to Participant A, from Participant D to Participant B, and from Participant D to Participant C. After Participant D establishes a connection to Participant A, but before Participant D establishes connections to Participant B and Participant C, there exists a period of time when Participant D is not known by Participant B and Participant C to be in the multiparty session. The result is a disjointed multiparty communications session where only Participant A knows all the participants within the multiparty session for such period of time. During such a disjointed multiparty communications session, communication may be lost or not properly provided to each participant currently within the session.

To prevent a disjointed multiparty communications session from occurring, it is known in the art to use a different type of communications session configuration. Instead of having every participant connect directly to all other participants of a multiparty session, one participant is designated as a connection hub in a hub-and-spoke, or star, configuration or topology. Similar to the topology created by the use of a dedicated communications server, one of the participants in a hub-and-spoke topology acts as a central point of the communications session. For example, if Participant A is designated as the central point of a communications session, then all other participants connect to Participant A and communicate with each other through Participant A. While eliminating the occurrence of a disjointed session, the hub-and-spoke, or star, configuration has disadvantages similar to those present when a dedicated communications server is employed in a multiparty communications session. For example, if the participant at the central point of the multiparty communications session loses connection, then the multiparty communications session must end or continue to utilize the computing and network resources of the central-point participant.

Accordingly, there is a need in the art for a system and method for managing a participant list, or roster, for a multiparty communications session without the need of a dedicated communications server.

There is also a need in the art for a system and method for providing multiparty communications sessions that do not become disjointed and that do not rely on a connection to a common or central point.

Additionally, there is a need in the art for a system and method for providing multiparty communications sessions where participants can join and leave the session without terminating the ongoing multiparty communication session between other participants.

SUMMARY OF THE INVENTION

Broadly described, the present invention comprises a system and methods for facilitating multiparty communications sessions with a plurality of participants and for dynamically designating a communications session manager (i.e., a "session manager"). More particularly, the present invention comprises a system and methods, including protocols, for: establishing a multiparty communications session between a

plurality of participants and their respective communication devices in a full-mesh topology; establishing a dynamically designated session manager uniquely associated with a first participant of the multiparty session and, hence, such participant's communication device; as necessary, adding and removing participants and their respective communication devices from the multiparty communications session; and, designating, or electing, another participant as session manager when the first participant exits the multiparty communications session.

Advantageously, the present invention provides multiparty communications sessions with or without the involvement of a central server or dedicated communications server such as a multipoint control unit (MCU). Also, the present invention accounts for every participant within the multiparty communications session and reduces the possibility of disjointed dialog occurring between participants thereof. Every participant attempting to join the multiparty communications session must communicate with the dynamically designated session manager. The dynamically designated session manager ensures that such participants join the communications session sequentially, thus reducing the possibility of disjointed communications. By providing the flexibility of a dynamically designated, or dynamically elected, session manager coupled with the arrangement of participants in a full-mesh topology, a multiparty communications session in accordance with the present invention is not disrupted when a participant serving as the session manager terminates its connection to the multiparty session because a new session manager may be designated. Through use of an election process for such designation of a new session manager, the present invention provides a smooth transition of session management from one participant to another participant. Additionally, the use of a full-mesh topology, where each participant is connected to every other participant, provides for the synchronization of information concerning a multiparty communications session and its participants.

Other features and advantages of the present invention will become apparent upon reading and understanding the present specification when taken in conjunction with the appended drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** displays a block diagram representation of the structural relationship of a plurality of participants of a multiparty communications session and the respective communication devices thereof in accordance with an exemplary embodiment of the present invention.

FIG. **2** displays a block diagram representation of a computing environment and computer systems thereof which the present invention may utilize in accordance with an exemplary embodiment thereof.

FIG. **3** displays a block diagram representation of a software domain of a communication device of the present invention in accordance with an exemplary embodiment thereof.

FIG. **4** displays a block diagram logical representation illustrating a multiparty communications session with a communication session manager not associated with a participant in accordance with an exemplary embodiment of the present invention.

FIG. **5** displays a block diagram logical representation illustrating a multiparty communications session with a communications session manager associated with a participant in accordance with an exemplary embodiment of the present invention.

FIGS. **6**A-**6**B display a flowchart representation of a method of creating a new communications session between participants thereof from the view of an inviting participant in accordance with an exemplary embodiment of the present invention.

FIGS. **7**A-**7**B display a flowchart representation of a method of creating a new communications session between participants thereof from the view of an invited participant in accordance with an exemplary embodiment of the present invention.

FIGS. **8**A-**8**B display a flowchart representation of a method of inviting a new participant into an already established communications session from the view of a referring participant in accordance with an exemplary embodiment of the present invention.

FIGS. **9**A-**9**B display a flowchart representation of a method of inviting a new participant into an already established communications session from the view of the session manager in accordance with an exemplary embodiment of the present invention.

FIGS. **10**A-**10**C display a flowchart representation of a method of inviting a new participant into an already established communications session from the view of an invited participant in accordance with an exemplary embodiment of the present invention.

FIGS. **11**A-**11**B display a flowchart representation of a method of inviting a new participant into an already established communications session from the view of an existing participant in accordance with an exemplary embodiment of the present invention.

FIG. **12** displays a flowchart representation of a method of sending instant messages in a multiparty communications session in accordance with an exemplary embodiment of the present invention.

FIGS. **13**A-**13**B display a flowchart representation of a method of designating a new communications session manager in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, in which like numerals represent like components or steps throughout the several views, FIG. **1** displays a block diagram representation of the structural relationship of a plurality of participants **104** of a multiparty communications session **100** and the respective communication devices **106** thereof in accordance with an exemplary embodiment of the present invention. The communications session **100** comprises a plurality of participants **104** (i.e., also sometimes referred to herein as "participants **404**") with each participant **104** including a communication device **106** (i.e., with the alphabetic subscripts in FIG. **1** designating different participants **104**). Each participant **104** (and, hence, each communication device **106**) includes a respective user agent **107** which facilitates communication with the other participants **104** of the multiparty session **100**. The number of participants **104** and user agents **107** within a communications session **100** may vary depending on the number of participants within the communications session **100** and, therefore, the communications session **100** is not limited to four participants **104**, communication devices **106**, and user agents **107** as shown in FIG. **1**.

The participants **104** and their communication devices **106** are communicatively connected via a communication network **101** (i.e., also sometimes referred to herein as a "network **101**"). One skilled in the art will recognize that a network **101** typically comprises the infrastructure and facilities

appropriate to communicatively connect a group of two or more communication devices **106** (including, without limitation, a plurality of computer systems in communication with each other). Such a network **101** and communication devices **106** may be configured in multiple topologies including, but not limited to, star, bus, or ring configurations. Also, a network **101** and communication devices **106** may be broadly categorized as belonging to a particular architecture including, but not limited to, peer-to-peer or client/server architectures. The network **101** may additionally be classified by the geographical location of the communication devices **106** and the types thereof. For example, a network **101** communicatively connecting a plurality of computer systems or servers located proximate to each other, such as within a building, is referred to as a local-area network (LAN); if the computer systems are located farther apart, the network **101** is generally referred to as a wide-area network (WAN), such as the Internet; if the computer systems are located within a limited geographical area, such as a university campus or military establishment, the network **101** is referred to as a campus-area network (CAN); if the computer systems are connected together within a city or town, the network **101** is referred to as a metropolitan-area network (MAN); and if the computer systems are connected together within a user's home, the network **101** is referred to as a home-area network (HAN).

Each participant **104** and communication device **106** thereof connects communicatively with the network **101** and, therefore, connects communicatively with each other participant **104** and communication device **106** thereof. Communication devices **106** may include, but are not limited to, a desktop computer, laptop computer, mobile computer, server computer, wireless phone, personal digital assistant (PDA), and any other device capable of communicating with another communication device **106**. In an exemplary embodiment of the present invention, the communication devices **106** are similar to the computer system **210** described below with reference to FIG. **2**. Each communication device **106** comprises a respective software domain **300** (i.e., as described below with reference to FIG. **3**) having a user agent **107** that assists in facilitating communication with other communication devices **106**. Each user agent **107**, through use of the communication device's **106** network interface and other appropriate hardware and software components, connects communicatively to the network **101** for the bi-directional communication of signals and media therewith and, therefore, connects communicatively to each other user agent **107** for the bi-directional communication of signals and media therewith. Due at least in part to the user agents **107**, the communication devices **106** have the capability of performing multiparty conferencing. Multiparty communication sessions **100** may be established in accordance with a number of common multiparty conferencing standards, including, but not limited to, server-based conferencing and client-based distributed conferencing (i.e., also known as full-mesh conferencing). Server-based conferencing, typically, requires a central server for signaling, media transfer, and managing the list of participants of a communications session **100**. Client-based distributed conferencing, generally, utilizes peer-to-peer (p2p) signaling and media transfer, but requires a distributed membership state where each participant stores a partial or full list of participants of a communications session **100** and changes within the membership state are propagated by peer. In an exemplary embodiment of the present invention, the user agents **107** (and, hence, the participants **104** and communication devices **106**) communicate via a modified version of client-based distributed conferencing. Similar to client-based distributed conferencing, the user agents **107** employ bi-directional p2p signaling and media transfer via the network **101**. Unlike client-based distributed conferencing, however, a session manager **401** keeps admission of new user agents **107** (and, hence, new participants **104** and communication devices **106**) in sequential order. The session manager **401** maintains and retains the authoritative participant list **322**, or roster **322**, while each user agent **107** retains a complete, but non-authoritative, copy of the current participant list **322**. The participant list **322**, or roster **322**, includes information or data identifying the participants **104** of a communications session **100**.

One skilled in the art will recognize that connecting communicatively may include or require any appropriate type of connection for the bi-directional communication of signals and/or media including, but not limited to, analog, digital, wired and wireless communication channels. Such communication channels may utilize, but not be limited to, copper wire, optical fiber, radio frequency, infrared, satellite, or other facilities and media.

FIG. **2** displays a block diagram representation of a computing environment **200** and computer systems **210**, **280** thereof which the present invention may utilize in accordance with an exemplary embodiment thereof. The computing environment **200** and computer systems **210**, **280** thereof represent only one example of a suitable computing environment and computer systems for the practice of the present invention and are not intended to suggest any limitation as to the scope of use or functionality of the invention. Nor should the computer systems **210**, **280** be interpreted as having any dependency or requirement relating to any one or combination of components illustrated in the exemplary computing environment **200**.

Hence, it should be understood that the present invention is operational with numerous other general purpose or special purpose computing system environments or configurations. Examples of well-known computing systems, environments, and/or configurations that may be appropriate or suitable for use as communication devices **106** of the present invention include, but are not limited to, personal computers, server computers, hand-held or laptop devices, multiprocessor systems, microprocessor-based systems, set top boxes, programmable consumer electronics, network PCs, minicomputers, mainframe computers, distributed computing environments that include any of the above systems or devices, and the like.

The present invention may also be described in the general context of comprising computer-executable instructions, such as program modules, being executed by a computer system. Generally, program modules include routines, programs, programming, objects, components, data, data structures, etc. that perform particular tasks or implement particular abstract data types. The present invention may be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote computer storage media, including, without limitation, in memory storage devices.

With reference to FIG. **2**, an exemplary communication device **106** of the present invention includes a general purpose computing device in the form of a computer system **210**. Components of computer system **210** may include, but are not limited to, a processing unit **220**, a system memory **230**, and a system bus **221** that couples various system components including the system memory **230** to the processing unit **220** for bi-directional data and/or instruction communication. The system bus **221** may be any of several types of bus structures including a memory bus or memory controller, a peripheral

bus, and a local bus using any of a variety of bus architectures. By way of example, and not limitation, such architectures include the Industry Standard Architecture (ISA) bus, Micro Channel Architecture (MCA) bus, Enhanced ISA (EISA) bus, Video Electronics Standards Association (VESA) local bus, and Peripheral Component Interconnect (PCI) bus (i.e., also known as the "Mezzanine bus").

Computer system **210** typically includes a variety of computer-readable media. Computer-readable media may comprise any available media that can be accessed by, read from, or written to by computer system **210** and may include both volatile and nonvolatile, removable and non-removable media. By way of example, and not limitation, computer-readable media may comprise computer storage media and communication media. Computer storage media includes both volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information such as computer-readable instructions, data, data structures, program modules, programs, programming, or routines. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magneto-optical storage devices, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by computer system **210**. Communication media typically embodies computer-readable instructions, data, data structures, program modules, programs, programming, or routines in a modulated data signal such as a carrier wave or other transport mechanism and includes any information delivery media. The term "modulated data signal" means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media includes wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, RF, infrared and other wireless media. Combinations of any of the above are also included within the scope of computer-readable media.

The system memory **230** includes computer storage media in the form of volatile and/or nonvolatile memory such as read only memory (ROM) **231** and random access memory (RAM) **232**. A basic input/output system **233** (BIOS), containing the basic routines that direct the transfer of information between elements within computer **210**, such as during start-up, is typically stored in ROM **231**. RAM **232** typically stores data and/or program instructions that are immediately accessible to and/or presently being operated on by processing unit **220**. By way of example, and not limitation, FIG. **2** illustrates operating system **234**, application programs **235**, other program modules **236**, and program data **237** which may be resident in RAM **232**, in whole or in part, from time-to-time.

The computer **210** may also include other removable/non-removable, volatile/nonvolatile computer storage media. By way of example only, FIG. **2** illustrates a hard disk drive **241** that reads from or writes to non-removable, nonvolatile magnetic media, a magnetic disk drive **251** that reads from or writes to a removable, nonvolatile magnetic disk **252**, and an optical disk drive **255** that reads from or writes to a removable, nonvolatile optical disk **256** such as a CD ROM or other optical media. Other removable/non-removable, volatile/nonvolatile computer storage media that may be included in the exemplary computing environment **200** include, but are not limited to, magnetic tape cassettes, flash memory cards, digital versatile disks, digital video tape, solid state RAM, solid state ROM, and the like. The hard disk drive **241** is typically connected to the system bus **221** through a non-removable memory interface such as interface **240**, and magnetic disk drive **251** and optical disk drive **255** are typically connected to the system bus **221** by a removable memory interface, such as interface **250**.

The drives **241**, **251**, **255** and their associated computer storage media discussed above and illustrated in FIG. **2**, provide storage of computer-readable instructions, data, data structures, program modules, programs, programming, or routines for computer system **210**. In FIG. **2**, for example, hard disk drive **241** is illustrated as storing operating system **244**, application programs **245**, other program modules **246**, and program data **247**. Note that these components may either be the same as or different from operating system **234**, application programs **235**, other program modules **236**, and program data **237**. Operating system **244**, application programs **245**, other program modules **246**, and program data **247** are given different numbers to illustrate that, at a minimum, they are different copies of operating system **234**, application programs **235**, other program modules **236**, and program data **237**. A user may enter commands and information into computer system **210** through connected input devices such as a keyboard **262** and pointing device **261**, commonly referred to as a mouse, trackball or touch pad. Other connected input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit **220** through a user input interface **260** that is coupled to the system bus **221**, but may be connected by other interface and bus structures, such as a parallel port, game port or a universal serial bus (USB). A monitor **291** or other type of display device is also connected to the system bus **221** via an interface, such as a video interface **290**. In addition to the monitor **291**, computer system **210** may also include other peripheral output devices such as speakers **297** and printer **296**, which may be connected through an output peripheral interface **295**.

The computer system **210** may operate in a networked environment using bi-directional communication connection links to one or more remote computer systems, such as a remote computer system **280**. The remote computer system **280** may be a personal computer, a laptop computer, a server computer, a router, a network PC, a peer device or other common network node, and typically includes many or all of the elements described above relative to the computer system **210**, although only a memory storage device **281** of remote computer system **280** has been illustrated in FIG. **2**. The bi-directional communication connection links depicted in FIG. **2** include a local area network (LAN) **271** and a wide area network (WAN) **273**, but may also include other networks. Such networks are commonplace in offices, enterprise-wide computer networks, intranets and the Internet.

When communicatively connected to a LAN **271**, the computer system **210** connects to the LAN **271** through a network interface or adapter **270**. When communicatively connected to a WAN **273**, the computer system **210** typically includes a modem **272** or other means for establishing a communication link over the WAN **273**, such as the Internet. The modem **272**, which may be internal or external, may be connected to the system bus **221** via the user input interface **260**, or other appropriate mechanism. In a networked environment, program modules depicted relative to the computer system **210**, or portions thereof, may be stored in the remote memory storage device **281**. By way of example, and not limitation, FIG. **2** illustrates remote application programs **285** as residing in memory storage device **281**. It will be appreciated that the

network connections shown are exemplary and other means of establishing a bi-directional communication link between the computers may be used.

FIG. **3** displays a block diagram representation of a software domain **300** of a communication device **106** of the present invention in accordance with an exemplary embodiment thereof. The software domain **300** resides on a communication device **106**, such as a computer system **210** illustrated in FIG. **2**, and is configured with hardware and software appropriate to perform tasks and provide capabilities and functionality as described herein. More particularly, the software domain **300** comprises a user interface **301**, client application programming interface (API) **307**, session initiation protocol (SIP) stack **310**, an audio/video stack **316**, and a roster **322**. Together, the user interface **301**, client API **307**, SIP stack **310**, audio/video stack **316**, and roster **322** form and function as part of a user agent **107**, as described above with reference to FIG. **1**. In an exemplary embodiment of the present invention, a software domain **300** resides on each of the communication devices **106** and assists in connecting users to a communications session **100** via the network **101** and in designating a session manager **401** for the communications session **100**.

The user interface **301** provides a user with an interface for partaking in a communications session **100**. In an exemplary embodiment of the present invention, the user interface **301** includes, but is not limited to, a message window for displaying messages, list of favorite participants, participant list for a communication session, text box for writing a message, and submit button for sending a message. Additionally, the user interface **301** may comprise programming, program modules, or machine instructions that perform or cause the performance of tasks: for displaying messages, the list of favorite participants, and the participant list for a communication session **100**; for inputting or writing messages; and, for sending messages, when executed by the processing unit **220** of the computer system **210**. One skilled in the art will recognize that the user interface **301** may be designed similar to instant messaging applications such as "MSN® MESSENGER" available from Microsoft Corporation of Redmond, Wash. The present invention, however, is not limited to instant messaging and, therefore, the present invention may relate to any type of communications session **100** between multiple participants **104** which may join or leave the communications session **100**.

The client API **307** connects communicatively and interacts with the user interface **301**, SIP stack **310**, audio/video stack **316**, and roster **322** through the inter-process communication of data, programming instructions, and/or commands, as the case may be. One skilled in the art will recognize that an API typically comprises a set of routines, programming, programming instructions, or program modules used by an application program to guide the execution of procedures by an operating system. In an exemplary embodiment of the present invention, the client API **307** provides a set of routines, programming, programming instructions, or program modules for communicating and interacting with the user interface **301**, SIP stack **310**, audio/video stack **316**, and roster **322**. Additionally, the client API **107** provides and receives SIP calls that enable multiparty conferencing and the designation of a new session manager **401**, which are described in more detail below with reference to FIGS. **6-13**.

Typically, the client API **307** comprises an abstraction layer that enables the establishment of communications sessions **100** by connecting participants **104** to other participants **104** using Session Initiation Protocol via the SIP stack **310**. The SIP stack **310** comprises system memory **230**, preferably, random access memory (RAM) **232**, which stores a plurality of primitives and/or messages which implement the SIP protocol in connection with the methods described herein. The SIP stack **310** handles the session calls between participants **104** which assist in setting up a communications session **100**. All SIP session calls are made through the SIP stack **310** and, therefore, the SIP stack **310** enables dialog between participants **104**.

The audio/video stack **316** comprises system memory **230** (i.e., preferably, random access memory (RAM) **232**) and/or non-volatile memory **240**, **250** which stores audio and video data for communicating media within a communications session **100**. The audio/video stack **316** is used in connection with the SIP stack **310** when communicating audio and video data that requires more bandwidth than is allocated for a SIP message. Audio and/or video data may be placed on the stack **316** when audio and/or video data is provided to or received from participants **104**.

For example and not limitation, if a user desires to set up a communications session **100**, then the user selects a corresponding option from the user interface **301**. In response, a routine of the user interface **301** associated with the option is executed by the processing unit **220** and calls an appropriate routine of the client API **307**. The client API routine creates a high level session object and makes a call to the SIP stack **310** to set up the communications session **100**. Responsive thereto, the SIP stack **310** communicates with the other participants **104** and sets up the multiparty session **100**. The SIP stack **310** then communicates to the client API routine that the multiparty session **100** has been created. Finally, the client API routine communicates to the user interface routine that the multiparty session **100** has been created.

In an exemplary embodiment of the present invention, the user interface's **301** routines, program modules, programming, and/or machine instructions reside, preferably, in an executable binary file stored in the hard disk drive **251** of each participant's computer system **210**. The client API **307** routines, program modules, programming, and/or machine instructions and the SIP stack **310**, preferably, reside in a dynamic-link library (dll) stored in the hard disk drive **251** of each participant's computer system **210**. Also, the audio/video stack **316**, preferably, resides in a separate dynamic-link library (dll) stored in the hard disk drive **251** of each participant's computer system **210**.

The roster **322** (i.e., sometimes referred to herein as the "participant list **322**") comprises list data identifying each participant **104** within a communications session **100**. Such data may include, but is not limited to, a unique identifier, participant or user name, or uniform resource identifier. The roster **322**, typically, resides in the random access memory (RAM) **232** of each participant's computer system **210** and provides the client API **307** thereof with information about each participant **104** of the communications session **100** when requested.

The Session Initiation Protocol (SIP), an application-layer control/signaling protocol, is a standard protocol that is well-known to one skilled in the art. Briefly described, SIP supports multiparty conferencing between user agents **107**. SIP provides the standard for initiation, modification, and termination of a conferencing session. Each multiparty conference is represented by SIP relationships between user agents **107** and is managed by SIP dialog between user agents **107**. SIP can support several models of multiparty conferencing such as, but not limited to, loosely coupled conferencing, fully distributed multiparty conferencing, and tightly coupled conferencing. Loosely coupled conferencing lacks a signaling relationship between user agents; does not have a central

point of control, such as a central server; and the participation list **322** is learned through control information that is passed during the conference using, for example, the Real Time Control Protocol (RTCP). Fully distributed multiparty conferencing comprises a signaling relationship between each of the participants without a central point of control. Tightly coupled conferencing utilizes a central point of control or focus with each participant **104** connecting to the central point during the communications session **100**. In an exemplary embodiment of the present invention, the communications sessions **100** between user agents **107** resemble tightly coupled conferencing.

SIP works in conjunction with other common protocols such as, but not limited to, Real-time Transport Protocol (RTP), Real-Time Streaming Protocol (RTSP), Media Gateway Control Protocol (MEGACO), and Session Description Protocol (SDP). Together with other common protocols, SIP enables user agents **107** to find and connect to other user agents **107**, thus creating a communications session **100**. Additionally, SIP enables other user agents **107** to join an already existing communications session **100**. SIP provides the necessary primitives used to implement a variety of services, however, SIP does not provide services or program modules, such as the services or program modules associated with the client API **307** described herein, nor the methods or protocols described herein.

For example and not limitation, a SIP message from a first participant **104***a* inviting a second participant **104***b* to join a communications session **100** is provided in Table 1. The first line of the SIP message contains the message name. With reference to Table 1, the message name includes an INVITE primitive to a Participant B and the SIP version number. The subsequent lines of the SIP message correspond to header fields related to the INVITE primitive. The "To" header field may contain a display name (i.e., Participant B) and a SIP uniform resource identifier (URI) (i.e., sip: B@microsoft.com) that directs the message to the intended recipient. The "From" header field may also contain a display name (i.e., Participant A), and a SIP URI (i.e., sip: A@microsoft.com) that indicates the message originator. The "Call-ID" header field forms part of the globally unique dialog identifier. Typically the "Call-ID" header field is generated by combining a random string with the originator's host name or interne protocol address. Together, the "To", "From", and "Call-ID" header fields define a dialog or peer-to-peer SIP relationship. The "CSeq" header field, also known as the command sequence header field, contains an integer and a SIP method name. The integer, generally, is incremented sequentially for each new message within the dialog/session. The "Contact" header field provides the recipient with a SIP URI that represents a direct path back to the message originator. The "Contact" header informs recipients where to send subsequent messages or requests. The "Supported" header field indicates what type of communications session **100** is supported and desired by the calling participant **104** (i.e., a multiparty session **100**). The "EndPoints" header field informs the recipient of the other participants **104** within the communications session **100** and is used in an INVITE message when establishing a new multiparty communications session **100**. The "Content-Type" header field describes the type of message (i.e., an instant message, audio data, or video data). The "Content-Length" header field provides the byte size of the message. After the header fields and between the ellipses, the message is provided. Other header fields will be defined when introduced within this description.

TABLE 1

```
INVITE sip:B@microsoft.com SIP/2.0
To: Participant B <sip:B@microsoft.com>
From: Participant A <sip:A@microsoft.com>
Call-ID: 1234567890
CSeq: 1 INVITE
Contact: sip:A@microsoft.com
Supported: multiparty
EndPoints: Participant A <sip:A@microsoft.com>
Content-Type: application/SDP
Content-Length: XXX
. . .
m = message 5060 sip sip:A@microsoft.com
. . .
```

One skilled in the art will recognize that the Session Initiation Protocol (SIP) is one of many signaling protocols that may be used to implement this invention. Accordingly, the present invention may be implemented with response codes and header fields different than those described herein and, therefore, the present invention should not be limited to using the Session Initiation Protocol.

FIG. **4** displays a block diagram logical representation illustrating a multiparty communications session **100** with a communications session manager **401** not associated with a participant **404** in accordance with an exemplary embodiment of the present invention. The multiparty communications session **100** comprises a session manager **401** and several participants **404** (i.e., sometimes referred to herein as "participants **104**"), including Participant A **404***a* through Participant D **404***d*. Participants **404** connect to a multiparty session **100** through the user agent **107** and software domain **300** residing on their respective communication device **106**. The number of participants **404** within a multiparty session **100** may vary depending on how many participants **404** join a particular multiparty session **100**, therefore, the multiparty session **100** is not limited to four participants **404** as shown in FIG. **4**.

Each participant **404** connects communicatively with the session manager **401**. FIG. **4** illustrates, by way of example, the connection between the participants **404** and the session manager **401**, but one skilled in the art will recognize that different configurations exist. The dashed-lines between the participants **404** and the session manager **401** represent session management calls. Session management calls are communications from the participants **404** to the session manager **401** that include data concerning connection to the multiparty session **100**, such as initiation requests, termination requests, modification requests, and invitation requests. Session management calls enable the session manager **401** to successfully manage the participant list **322**, or roster **322**, of the current multiparty session **100**.

Additionally, each participant **404** connects communicatively with each other participant **404**. The solid-lines between the participants **404** represent media calls. Media calls are communications between participants **404** and include, but are not limited to, text, audio, and video. Unlike the Session Initiation Protocol which assumes that all data will be transferred over a signaling layer, media calls may create an explicit call by using the INVITE primitive provided by SIP. In other words, a multiparty session **100** between the participants **404** is created before media is transferred. Typically, media is subsequently transferred over an instant messaging session, however, separate audio and video sessions may be created between each participant **404**, if necessary due to bandwidth constraints. Alternatively, media may be transferred through a media multipoint control unit (MCU) that, for example, may be located on a central server. One

skilled in the art will recognize that with central session control and a coordination point, a communications session **100** may be constructed in a variety of topologies that utilize the advantages of the present invention including, but not limited to, full-mesh topology, MCU-based topology, and a hierarchical fan-out topology.

The session manager **401** ensures that the participant list **322**, or roster **322**, properly reflects the participants **404** within the current communications session **100**. Accordingly, all session calls are directed to the session manager **401**. Additionally, the session manager **401** may also store other information about the multiparty session **100** that might be coordinated to each of the participants **404** within a communications session **100**. The session manager **401** synchronizes session actions such as, but not limited to, participants **404** joining a communications session **100**, participants **404** leaving a communications session **100**, and inviting participants **404** into a communications session **100**. Other synchronization roles may also be handled by the session manager **401**, such as moderation of a distributed meeting. The session manager **401** also implements a rule set for the particular communications session **100**. Such rules may include, but are not limited to, access restrictions, session duration, and session capacity. By way of example, and not limitation, the session manager **401** resides at a different location than Participant A **404***a*, Participant B **404***b*, Participant C **404***c*, and Participant D **404***d*. Such a location may include, but is not limited to, a central server, MCU, or remote client computer.

For example and not limitation, if Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* are members of a communication session **100**, then Participant D **404***d* must send a session call to the session manager **401** to request admission to the communications session **100**. Alternatively, Participant A **404***a*, Participant B **404***b*, or Participant C **404***c* may "refer" Participant D **404***d* to the session by sending a "refer" session call to the session manager **401**. The session manager **401** may then apply the rule set to determine if Participant D **404***d* should be allowed within the current communications session **100**. If the session manager **401** determines that Participant D **404***d* may have access to the communications session **100**, then the session manager **401** sends an "invite" session call to Participant D **404***d*. If Participant D **404***d* accepts the invitation, then the session manager **401** updates the participant list **322**, or roster **322**, to include Participant D **404***d*. The session manager **401** provides Participant D **404***d* with the then current participant list **322**, including Participant A **404***a*, Participant B **404***b*, and Participant C **404***c*, through the original "invite" session call. Once a signaling session is established between the session manager **401** and Participant D **404***d*, then the current participant list **322** is propagated to Participant D **404***d* and connections are established. Other potential scenarios are discussed below with reference to FIGS. **6-13**.

FIG. **5** displays a block diagram logical representation illustrating a multiparty communications session **100** with a communications session manager **401** associated with a participant **404** in accordance with an exemplary embodiment of the present invention. Similar to FIG. **4**, the multiparty communications session **100** illustrated in FIG. **5** comprises a session manager **401** and several participants **404**, including Participant A **404***a* through Participant D **404***d*. Likewise, participants **404** comprise respective communication devices **106** and software domains **300** (i.e., including, but not limited to, respective user agents **107**) necessary to establish a connection to the multiparty session **100**, to designate a new session manager **401** if required, and to perform task and methods described herein. The number of participants **404** within a multiparty session **100** may vary depending on how many participants **404** join a particular multiparty session **100**, therefore, the multiparty session **100** is not limited to four participants **404** as shown in FIG. **5**.

In an exemplary embodiment of the present invention, the session manager **401** resides with a designated participant **404**. For example and not limitation, the session manager **401** may be associated with Participant A **404***a*, as shown in FIG. **5**. Therefore, each participant **404** connects communicatively to the session manager **401** (i.e., to Participant A **404***a*). Such a configuration eliminates the necessity of a central server or MCU to manage the participant list **322**.

The dashed-lines between Participant A **404***a*, Participant B **404***b*, Participant C **404***c*, and Participant D **404***d* represent session management calls which are directed to the session manager **401** residing with Participant A **404***a*. Additionally, the solid-lines between each of the participants **404** represent media calls. Except with respect to the location of the session manager **401**, the multiparty session **100** illustrated in FIG. **5** substantially resembles the multiparty session **100** described above with reference to FIG. **4**. Accordingly, no further description is necessary herein.

FIGS. **6A-6B** display a flowchart representation of a method **600** of creating a new communications session **100** between participants **404** thereof from the view of an inviting participant in accordance with an exemplary embodiment of the present invention. The creation of a new communications session **100** requires at least two participants **404** where no communications session **100** existed previously between the participants **404** or where a new communications session **100** is desired regardless of any other existing communications session **100**. Preferably, a communications session **100** should be established using Session Initiation Protocol (SIP) instead of simply sending instant messages between participants **404** using a MESSAGE primitive or equivalent thereof under a different protocol. One skilled in the art will recognize that instant messaging is only one instance of multiparty conferencing. The present invention may extend to instant messaging and other types of multiparty conferencing such as, but not limited to, audio and video conferencing. The establishment of a communications session **100** using Session Initiation Protocol (SIP) provides better session control and greater flexibility than the use of instant messaging because additional session information can be exchanged during the creation of the communications session **100**. To provide for user agents **107** that do not support the INVITE message (also sometimes referred to herein as "dumb user agents"), the communications session **100** must provide for successful degradation (i.e., providing support for devices that are not capable of multiparty communication).

For the purposes of the description herein with reference to FIGS. **6A-6B**, no communications session **100** currently exists between Participant A **404***a* and Participant B **404***b*, and Participant A **404***a* performs the functions of the session manager **401**. After starting at step **601**, Participant A **404***a* (i.e., the session manager **401**) proceeds to step **604** where the session manager **401** sends a multiparty INVITE message to Participant B **404***b*. At step **607**, the session manager **401** determines whether Participant B **404***b* responded to the INVITE message in accordance with the required retry mechanism. The retry mechanism, preferably, designates how much time is to elapse before the session manager **401** evaluates whether Participant B **404***b* responded to the INVITE message. The retry mechanism may also designate how many times the session manager **401** should send a multiparty INVITE message to Participant B **404***b*, before evaluating if a response was received from Participant B

404*b*. If Participant B **404***b* does not respond in accordance with the required retry mechanism, then the session manager **401** proceeds to step **610** where it sends an INVITE error to Participant A **404***a* (i.e., in Participant A's **404***a* role as the calling participant). Next, the session manager **401** ceases operation in accordance with method **600** at step **613** due to failure of the INVITE from the session manager **401** to Participant B **404***b*.

If, at step **607**, the session manager **401** receives a response from Participant B **404***b* in accordance with the required retry mechanism, the session manager **401** proceeds to step **616** where it determines whether Participant B **404***b* has accepted the INVITE by analyzing the content of the received response. If the session manager **401** determines that Participant B **404***b* did not accept the INVITE (i.e., for example and not limitation, due to an error or rejection), then the session manager **401** proceeds to step **619** as described below, otherwise the session manager **401** proceeds to step **622** of the method **600**.

At step **619**, the session manager **401** determines whether Participant B **404***b* understood the multiparty INVITE message by examining the received response from Participant B **404***b* to ascertain if the appropriate data thereof indicates that Participant B **404***b* supports multiparty sessions **100**. If session manager **401** determines that Participant B **404***b* understood the multiparty INVITE message, then the session manager **401** terminates operation according to method **600** at step **613**, because Participant B **404***b* declined the invitation and, therefore, the INVITE from Participant A **404***a* to Participant B **404***b* failed. If, however, the session manager **401** determines that Participant B **404***b* did not understand the multiparty INVITE message, then the session manager **401** proceeds to step **631** where the session manager **401** establishes and designates a one-on-one communications session **100** between Participant A **404***a* and Participant B **404***b* with Participant B **404***b* being identified as a downlevel client (i.e., a dumb user agent). After the session between Participant A **404***a* and Participant B **404***b* is established, the session manager **401** ceases operation in accordance with method **600** at step **628**, as a consequence of the successful completion of the INVITE.

If, however, at step **616**, the session manager **401** determines that Participant B **404***b* accepted the INVITE, then the session manager **401** establishes a multiparty session **100** between Participant A **404***a* and Participant B **404***b* at step **622**. By accepting the multiparty INVITE, Participant B **404***b* has indicated that it understood the multiparty INVITE message. Accordingly, the session manager **401** identifies Participant B **404***b* as a multiparty client and designates the communications session **100** as a multiparty session **100**. Next, at step **625**, the session manager **401** sends an acknowledgement (ACK) to Participant B **404***b* indicating that the communications session **100** has been established. The session manager **401** terminates operation in accordance with method **600** at step **628**.

FIGS. **7**A-**7**B display a flowchart representation of a method **700** of creating a new communications session **100** between participants **404** thereof from the view of an invited participant **404** in accordance with an exemplary embodiment of the present invention. For purposes of the following description and similar to the scenario described above with respect to FIGS. **6**A-**6**B, no communications session **100** currently exists between Participant A **404***a* and Participant B **404***b*, and Participant A **404***a* performs the functions of the session manager **401**.

After starting at step **701**, Participant B **404***b* receives a multiparty INVITE message from the session manager **401** at step **704** of method **700**. At step **707**, Participant B **404***b* determines whether it is blocking communications from the session manager **401** (i.e., Participant A **404***a* as the calling participant). If Participant B **404***b* determines that it is blocking communications from the session manager **401**, Participant B **404***b* proceeds to step **710** where it sends an offline error to the session manager **401**. Participant B **404***b* ceases operation in accordance with method **700** at step **713**, due to the failure of the INVITE received from session manager **401** by Participant B **404***b*. One skilled in the art will recognize that the offline error may be used to mask that Participant B **404***b* is blocking communication from other participants **404**. Alternatively, Participant B **404***b* may send different error messages or not send an error message at all.

If, however, at step **707** Participant B **404***b* determines that it is not blocking communications with the session manager **401**, then Participant B **404***b* proceeds to step **716** where Participant B **404***b* determines whether it supports multiparty sessions **100**. If Participant B **404***b* determines that it does not support multiparty sessions **100**, then Participant B **404***b* proceeds to step **719** where Participant B **404***b* sends an error message to the session manager **401**. Participant B **404***b* then proceeds to step **713** of method **700**, due to failure of the INVITE received from the session manager **401**.

If, at step **716**, Participant B **404***b* determines that it supports multiparty sessions **100**, then Participant B **404***b* proceeds to step **722** of method **700** where it determines whether the INVITE message seeks to establish a new communications session **100**. If the INVITE message does not seek to establish a new communications session **100**, then Participant B **404***b* proceeds to step **725** where it sends an already-in-session error to the session manager **401**. Participant B **404***b* then ceases operation in accordance with method **700** at step **728**, due to failure of the INVITE received from the session manager **401**. Otherwise, if the INVITE message seeks to establish a new communications session **100**, then Participant B **404***b* advances to step **731** where Participant B **404***b* sends a 200 OK message to the session manager **401** (i.e., to Participant A **404***a* in its capacity as the inviting participant). Then, at step **734**, the session manager **401** designates that media may be communicated from Participant B **404***b* to Participant A **404***a*. Participant B **404***b* then ends operation in accordance with method **700** at step **737**.

Table 2 illustrates an exemplary call flow (i.e., using SIP) for Participant A **404***a* (i.e., serving as the session manager **401**) inviting Participant B **404***b* into a new communications session **100**, where Participant B **404***b* supports multiparty sessions **100**. In Table 2, the "EndPoints" header field provides Participant B **404***b* with a list of participants **404** that Participant B **404***b* must connect with in order to properly join the communications session **100**. If Participant B **404***b* already has a connection to a participant **404** within the list of participants **404**, then no further connection is necessary. Further, Participant B **404***b* need not connect to itself, if Participant B **404***b* is within the list of participants **404**. Also in Table 2, the "RM" header field indicates the location of the session manager **401**. The RM header field is not part of the basic Session Initiation Protocol. The present invention introduces a layer of functionality on top of the Session Initiation Protocol to assist in designating and electing a participant **404** as the session manager **401**. Additionally in Table 2, the "200 OK" header field contains the SIP response code (i.e., 200) and the reason phrase (i.e., OK) which indicates whether a participant **404** has accepted a message or request. Further, the "Require" header field indicates that the invited participant **404***b* must support multiparty sessions **100** in order to accept the INVITE.

TABLE 2

A->B:	INVITE sip:B@microsoft.com SIP/2.0 To: sip:B@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:A@microsoft.com Supported: multiparty EndPoints: Participant A <sip:A@microsoft.com> RM: sip:A@microsoft.com Content-Type: application/SDP Content-Length: XXX . . . m = message 5060 sip sip:A@microsoft.com . . .
B->A:	SIP/2.0 200 OK To: sip:B@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:B@microsoft.com Require: multiparty Content-Length: XXX . . . m = message 5060 sip sip:B@microsoft.com . . .
A->B:	ACK sip:B@microsoft.com SIP/2.0 To: sip:B@microsoft.com From: sip:A@microsoft.com Call-ID: 1234567890 CSeq: 1 ACK Content-Length: 0

Table 3 illustrates a call flow (i.e., using SIP) for the session manager **401** inviting Participant B **404***b* into a new communications session **100**, where Participant B **404***b* does not support multiparty sessions **100**. Although Participant B **404***b* sends a "200 OK" header in the call flow, the "Required" header field is absent from the SIP message, thereby indicating that Participant B **404***b* does not support multiparty sessions **100**. When the session manager **401** receives the "200 OK" SIP message, the session manager **401** determines whether Participant B **404***b* supports multiparty conferencing. If Participant B **404***b*, as in this example, does not support multiparty conferencing, then the session manager **401** establishes a one-on-one communications session **100** between Participant A **404***a* and Participant B **404***b*.

TABLE 3

A->B:	INVITE sip:B@microsoft.com SIP/2.0 To: sip:B@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:A@microsoft.com Supported: multiparty EndPoints: Participant A <sip:A@microsoft.com> RM: sip:A@microsoft.com Content-Type: application/SDP Content-Length: XXX . . . m = message 5060 sip sip:A@microsoft.com . . .
B->A:	SIP/2.0 200 OK To: sip:B@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:B@microsoft.com Content-Length: XXX . . . m = message 5060 sip sip:b@microsoft.com . . .

FIGS. **8**A-**8**B display a flowchart representation of a method **800** of inviting a new participant **404** into an already established communications session **100** from the view of a referring participant **404** in accordance with an exemplary embodiment of the present invention. Once a communications session **100** is initialized as described above with reference to FIGS. **6**A, **6**B, **7**A, and **7**B, additional participants **404** may be invited into the existing communications session **100** by the session manager **401**. To prevent the possibility of multiple participants **404** joining a communications session **100** at the same time and receiving different lists of participants **404** (i.e., and creating a disjointed communications session **100**), all participants **404** joining the communications session **100** must obtain the list of participants **404** from the session manager **401**. For example, when Participant B **404***b* within an existing communications session **100** desires to invite Participant C **404***c* into the communications session **100**, Participant B **404***b* must contact the session manager **401** and "refer" the session manager **401** to Participant C **404***c*. The session manager **401** then "invites" Participant C **404***c* into the communications session **100** as described below.

For the purposes of FIGS. **8**A-**8**B, Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* are members of a current communications session **100** with Participant A **404***a* acting as the session manager **401**. If Participant B **404***b* wants Participant D **404***d* to join the communications session **100**, then Participant B **404***b* must request that the session manager **401** (i.e., Participant A **404***a*) send an INVITE message to Participant D **404***d* in order to "invite" Participant D **404***d* to join the on-going communications session **100**. Such a request is accomplished by Participant B **404***b* sending an appropriate REFER message to the session manager **401**.

After starting at step **801**, Participant B **404***b* advances to step **804** of method **800** where Participant B **404***b* sends an appropriate REFER message to the session manager **401** on behalf of Participant D **404***d* in order to request that the session manager **401** invite Participant D **404***d* to join the communications session **100**. Next, at step **807**, Participant B **404***b* determines whether the session manager **401** responded in accordance with a required retry mechanism by evaluating whether a response was received from the session manager **401**. If the session manager **401** did not respond in accordance with the required retry mechanism, Participant B **404***b* proceeds to step **810** where Participant B **404***b* receives an error message from the session manager **401** signifying that the session manager **401** did not respond to the REFER message. Participant B **404***b* ceases operation in accordance with method **800** at step **813**, due to the failure of the REFER received by the session manager **401** from Participant B **404***b*. If, however, at step **807**, Participant B **404***b* receives an appropriate response from the session manager **401** in accordance with the required retry mechanism, then Participant B **404***b* advances to step **816** where Participant B **404***b* determines whether the session manager **401** accepted the REFER by evaluating the appropriate data in the response message from the session manager **401**. If Participant B **404***b* determines that the session manager **401** did not accept the REFER, then Participant B **404***b* terminates operation in accordance with method **800** at step **813**, due to the failure of the REFER received by the session manager **401** from Participant B **404***b*. If, at step **816**, Participant B **404***b* determines that the session manager **401** accepted the REFER, then Participant B **404***b* proceeds to step **819** where Participant B **404***b* yields until a NOTIFY message is received from the session manager **401** indicating that Participant D **404***d* has successfully joined the communications session **100**. Such a notification is not required for communication between the participants **404** to occur, but should be implemented to ensure conformance with the established standard.

Next, Participant B **404***b* proceeds to step **822** where the session manager **401** determines whether Participant D **404***d* successfully joins the communications session **100** by evaluating the appropriate response/acknowledgment messages from Participant D **404***d*. If the session manager **401** determines that Participant D **404***d* did not successfully join the communications session **100**, then Participant B **404***b* terminates operation in accordance with method **800** at step **825**, due to the failure of the INVITE from the session manager **401** to Participant D **404***d*. Otherwise, if the session manager **401** determines that Participant D **404***d* successfully joined the communication session **100**, then Participant B **404***b* ends operation in accordance with method **800** at step **828**. Participant D **404***d* officially joins the communications session **100** when it establishes media sessions with all of the participants **404** currently within the communications session **100**. While every participant **404** possesses a participant list **322** within the communications session **100**, only the participant **404** acting as the session manager **401** (i.e., Participant A **404***a*) provides the list of participants **404** to Participant D **404***d* during the INVITE.

FIGS. **9**A-**9**B display a flowchart representation of a method **900** of inviting a new participant **404** into an already established communications session **100** from the view of the session manager **401** in accordance with an exemplary embodiment of the present invention. Similar to the description described above for FIGS. **8**A-**8**B, Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* are members of a current communications session **100** with Participant A **404***a* performing the functions of the session manager **401**. If Participant B **404***b* wants Participant D **404***d* to join the communications session **100**, then Participant B **404***b* must "refer" the session manager **401** to send an INVITE message to Participant D **404***d*. The session manager **401** receives the REFER message from Participant B **404***b* and sends an INVITE message to Participant D **404***d*.

After starting at step **901**, the session manager **401** proceeds to step **904** of method **900** where it receives a REFER message from Participant B **404***b* referring Participant D **404***d* to a communications session **100**. Next, the session manager **401** advances to step **907** where the session manager **401** determines whether the REFER message received from Participant B **404***b* is for an existing communications session **100**. If the session manager **401** determines that the REFER message from Participant B **404***b* is not for an existing communications session **100**, then the session manager **401** proceeds to step **910** where the session manager **401** sends an error message to Participant B **404***b* indicating that the REFER message is for a nonexistent communications session **100**. The session manager **401** then ends operation in accordance with the method **900** at step **913**, due to the failure of the REFER by Participant B **404***b* to the session manager **401**. If, however, at step **907**, the session manager **401** determines that the REFER message received from Participant B **404***b* is for an existing communications session **100**, then the session manager **401** proceeds to step **916** where the session manager **401** sends a 200 OK message to Participant B **404***b*, indicating receipt of a valid REFER.

Next, at step **919**, the session manager **401** sends an INVITE message to Participant D **404***d*. The session manager **401** then proceeds to step **922** of method **900** where the session manager **401** determines whether Participant D **404***d* accepted the INVITE by evaluating any responses from Participant D **404***d*. If the session manager **401** determines that Participant D **404***d* did not accept the INVITE, then the session manager advances to step **925** where the session manager **401** sends a NOTIFY message with an error message to Participant B **404***b* (i.e, the referring participant). The session manager **401** then ends operation in accordance with method **900** at step **928**, due to the failure of the INVITE from the session manager **401** to Participant D **404***d*.

If, however, at step **922**, the session manager **401** determines that Participant D **404***d* accepted the INVITE, then the session manager **401** proceeds to step **931** where the session manager **401** sends a NOTIFY message with a success message to Participant B **404***b*, indicating that Participant D **404***d* has successfully joined the communications session **100**. The session manager **401** then ends operation in accordance with method **900** at step **934**.

FIGS. **10**A-**10**C display a flowchart representation of a method **1000** of inviting a new participant **404** into an already established communications session **100** from the view of an invited participant **404** in accordance with an exemplary embodiment of the present invention. Similar to the description above for FIGS. **8**A-**8**B and **9**A-**9**B, Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* are members of a current communications session **100** with Participant A **404***a* performing the functions of the session manager **401**. If Participant B **404***b* wants Participant D **404***d* to join the communications session **100**, then Participant B **404***b* must "refer" the session manager **401** to send an INVITE message to Participant D **404***d*. Participant D **404***d* must properly accept the INVITE from the session manager **401** in order to join the communications session **100**.

After starting at step **1001**, Participant D **404***d* proceeds to step **1004** of method **1000** where it receives an INVITE message to a communications session **100** from the session manager **401**. Next, at step **1007**, Participant D **404***d* determines whether it is blocking communications from the session manager **401**. If Participant D **404***d* determines that it is blocking communications from the session manager **401**, then Participant D **404***d* proceeds to step **1010** where it sends an offline error to the session manager **401**. Participant D **404***d* then terminates operation in accordance with method **1000** at step **1013**, due to the failure of the INVITE from the session manager **401** to Participant D **404***d*. If, however, at step **1007**, Participant D **404***d* determines that it is not blocking communications from the session manager **401**, then Participant D **404***d* proceeds to step **1016** where Participant D **404***d* determines whether it supports multiparty sessions **100**. If Participant D **404***d* determines that it cannot support a multiparty session **100**, then Participant D **404***d* proceeds to step **1019** where it sends an error message to the session manager **401**. Participant D **404***d* then ends operation in accordance with method **1000** at step **1013**, due to the failure of the INVITE from the session manager **401** to Participant D **404***d*. If Participant D **404***d* cannot support multiparty sessions **100**, then Participant D **404***d* is considered a dumb user agent and, therefore, can only support a one-on-one communications session **100**.

If, however, at step **1016**, Participant D **404***d* determines that it can support multiparty sessions **100**, then Participant D **404***d* proceeds to step **1022** where Participant D **404***d* determines whether the INVITE message from the session manager **401** is for an existing multiparty session **100**. If Participant D **404***d* determines that the INVITE message from the session manager **401** is for an existing multiparty session **100**, then Participant D **404***d* advances to step **1025** where Participant D **404***d* sends a failure response to the session manager **401**, and the session manager **401**, in turn, sends an error message to Participant B **404***b* (i.e., the referring participant **404**) indicating that Participant D **404***d* is already in the communications session **100**. Participant D **404***d* ends operation in accordance with method **1000** at step **1028**, due to the

failure of the INVITE from the session manager **401** to Participant D **404***d*. Otherwise, if at step **1022**, Participant D **404***d* determines that the INVITE message from the session manager **401** is not for an existing communications session **100**, then Participant D **404***d* advances to step **1031** where Participant D **404***d* sends a join INVITE message to each participant **404** (i.e., also referred to herein as "contact point") listed in the original INVITE message from the session manager **401**. Next, Participant D **404***d* proceeds to step **1034** where Participant D **404***d* sends a 200 OK message to the session manager **401**.

Participant D **404***d* then advances to step **1037** where Participant D **404***d* determines whether any contact point returned an error to the join INVITE or did not respond within three attempts to connect, by evaluating the responses from the other participants **404**. One skilled in the art will recognize that the number of attempts may be altered as desired and may depend on the protocol in use. If Participant D **404***d* determines that a contact point returned an error to the join INVITE or did not respond within three attempts to connect, then Participant D **404***d* proceeds to step **1040** where Participant D **404***d* sends a BYE message to any contact point that has accepted the join INVITE. Next, at step **1043**, Participant D **404***d* sends a BYE message to the session manager **401**. Participant D **404***d* then terminates in accordance with method **1000** at step **1046**, due to the failure of the INVITE from the session manager **401** to Participant D **404***d*.

If, however, at step **1037**, Participant D **404***d* determines that every contact point responded without error, then Participant D **404***d* advances to step **1049** where Participant D **404***d* sends an ACK message to Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* after receiving all of the 200 OK messages from the participants **404** regarding the join INVITE message. Participant D **404***d* ends operation in accordance with method **1000** at step **1052**.

FIGS. **11**A-**11**B display a flowchart representation of a method **1100** of inviting a new participant **404** into an already established communications session **100** from the view of an existing participant **404** in accordance with an exemplary embodiment of the present invention. Similar to the description above for FIGS. **8**A-**8**B, **9**A-**9**B, and **10**A-**10**C, Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* are members of a current communications session **100** with Participant A **404***a* performing the functions of the session manager **401**. If Participant B **404***b* wants Participant D **404***d* to join the communications session **100**, then Participant B **404***b* must "refer" the session manager **401** to send an INVITE message to Participant D **404***d*. Participant A **404***a*, Participant B **404***b*, and Participant C **404***c* must properly accept the join INVITE from Participant D **404***d* in order for Participant D **404***d* to successfully join the communications session **100**. For purposes of the following description, the method **1100** will be discussed with reference to Participant C **404***c*. A substantially similar method **1100** will be followed with reference to all current participants **404** within the communications session **100** that Participant D **404***d* wishes to join.

After starting at step **1101**, Participant C **404***c* proceeds to step **1104** of method **1100** where Participant C **404***c* receives a join INVITE message from Participant D **404***d*. Participant C **404***c* advances to step **1107** where Participant C **404***c* determines whether the join INVITE message from Participant D **404***d* refers to an existing communications session **100**. If Participant C **404***c* determines that the join INVITE message from Participant D **404***d* does not refer to an existing communications session **100**, then Participant C **404***c* proceeds to step **1110** where the INVITE message refers to the initiation of a new communications session **100** discussed above in more detail with regard to FIGS. **5**A-**5**B and **6**A-**6**B.

If, however, at step **1107**, Participant C **404***c* determines that the join INVITE message refers to an existing communications session **100**, then Participant C **404***c* proceeds to step **1113** where Participant C **404***c* determines whether the communications session **100** referred to in the INVITE message from Participant D **404***d* is known. If Participant C **404***c* determines that the communications session **100** referred to in the INVITE message from Participant D **404***d* is not known, then Participant C **404***c* advances to step **1116** where Participant C **404***c* sends an unknown session error to Participant D **404***d*. Participant C **404***c* then ends operation in accordance with method **1100** at step **1119**, due to the failure of the join INVITE from Participant D **404***d* to Participant C **404***c*.

If at step **1113**, Participant C **404***c* determines that the communications session **100** referred to in the INVITE message from Participant D **404***d* is known, then Participant C **404***c* proceeds to step **1122** where Participant C **404***c* determines whether it is already part of the communications session **100** referred to in the INVITE message from Participant D **404***d*. If Participant C **404***c* determines that it is not already part of the communications session **100** referred to in the INVITE message from Participant D **404***d*, then Participant C **404***c* proceeds to step **1125** where Participant C **404***c* sends an error message to Participant D **404***d* indicating that Participant C **404***c* is not already a member of the communications session **100**. Participant C **404***c* terminates operation in accordance with method **1100** at step **1128**, due to the failure of the join INVITE from Participant D **404***d* to Participant C **404***c*. Participant C **404***c* determines whether it is a member of the existing communications session **100** for two reasons. First, Participant C **404***c* might have left the communications session **100** after Participant D **404***d* received the list of participants **404** from the session manager **401**, but before receiving the INVITE message from Participant D **404***d*. Second, Participant C **404***c* might be registered at multiple end points, only one of which is a participant **404** of the communications session **100** referred to in the INVITE message. When an INVITE message for Participant C **404***c* is received, the INVITE message will branch to all of the end points, including those that are not part of the existing communications session **100**. Step **1122** ensures that only the appropriate participants **404** will be allowed to accept the INVITE.

Otherwise, if at step **1122**, Participant C **404***c* determines that it is already a member of the communications session **100** referred to in the INVITE message from Participant D **404***d*, then Participant C **404***c* advances to step **1131** where Participant C **404***c* determines whether it is the session manager **401** for the communications session **100** referred to in the INVITE message from Participant D **404***d*. If Participant C **404***c* determines that it is the session manager **401** for the communications session **100** referred to in the INVITE message from Participant D **404***d*, then Participant C **404***c* proceeds to step **1134** where Participant C **404***c* sends an error message to Participant D **404***d*, indicating that the communications session **100** referred to in the INVITE message should already exist between Participant C **404***c* and Participant D **404***d*. Participant C **404***c* then terminates operation in accordance with method **1100** at step **1128**, due to failure of the INVITE between Participant D **404***d* and Participant C **404***c*.

If, however, at step **1131**, Participant C **404***c* determines that it is not the session manager **401** for the communications session **100** referred to in the INVITE message from Participant D **404***d*, then Participant C **404***c* advances to step **1137** where it sends a 200 OK message to

Participant D **404***d*. Next, Participant C **404***c* proceeds to step **1140** where Participant C **404***c* designates a media connection between Participant C **404***c* and Participant D **404***d* as existing. Participant C **404***c* then ends operation in accordance with method **1100** at step **1143**.

Table 4 illustrates the call flow (i.e., using SIP) for Participant B **404***b* referring Participant D **404***d* into an existing communications session **100**, where Participant A **404***a* is the session manager **401** and Participant D **404***d* supports multiparty communications sessions **100**. To ensure stability, the session manager **401** will not process an invitation request until all previous invitations have been processed. A sequential invitation scheme guarantees that new participants **404** receive a correct list of participants **404** within the communications session **100**. In Table 4, the "REFER" header field indicates that the SIP message is referring a participant **404**. The "Refer-To" header field indicates who is being referred and the "ReferredBy" header field indicates who has made the referral. Also in Table 4, the "202 Accepted" header field contains the SIP response code (i.e., 202) and the reason phrase (i.e., accepted) that indicates whether a participant **404** has accepted an invitation. The "NOTIFY" header field indicates that the message is a notification to a participant **404** that an event has occurred, a change has occurred, that information needs to be updated, or the like. Additionally, the "Event" header indicates what type of event is occurring or has occurred. The "TriggeredInvite" header field determines whether the SIP message is an INVITE to join an existing multiparty session **100**.

TABLE 4

B->A:	REFER sip:D@microsoft.com SIP/2.0 To: sip:A@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 1 REFER Refer-To: D@microsoft.com Referred-By: B@microsoft.com
A->B:	SIP/2.0 202 Accepted To: sip:A@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 1 REFER Refer-To: D@microsoft.com
A->D:	INVITE sip:D@microsoft.com SIP/2.0 To: sip:D@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:A@microsoft.com Referred-By: B@microsoft.com Required: multiparty EndPoints: Participant A <sip:A@microsoft.com>, Participant B<sip:B@microsoft.com>, Participant C <sip:C@microsoft.com>, Participant D <sip:D@microsoft.com> RM: sip:A@microsoft.com Content-Type: application/SDP Content-Length: XXX . . . m = message 5060 sip sip:D@microsoft.com . . .
D->A:	SIP/2.0 200 OK To: sip:D@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 1 REFER Require: multiparty Contact: sip:A@microsoft.com Content-Length: 0

TABLE 4-continued

A->D:	ACK sip:D@microsoft.com SIP/2.0 To: sip:D@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID 1234567890 CSeq: 1 ACK Content-Length: 0
A->B:	NOTIFY B@microsoft.com To: sip:B@microsoft.com From: Participant A <sip:A@microsoft.com> Call-ID: 1234567890 CSeq: 2 NOTIFY Event: REFER Contact: sip:B@microsoft.com Content-Type: application/sip Content-Length: 16 . . . SIP/2.0 200 OK . . .
D->B:	INVITE sip:B@microsoft.com SIP/2.0 To: sip:B@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:D@microsoft.com Supported: multiparty TriggeredInvite: TRUE RM: sip:A@microsoft.com Content-Type: application/SDP Content-Length: XXX . . . m = message 5060 sip sip:D@microsoft.com . . .
D->C:	INVITE sip:C@microsoft.com SIP/2.0 To: sip:C@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Contact: sip:C@microsoft.com Supported: multiparty TriggeredInvite: TRUE RM: sip:A@microsoft.com Content-Type: application/SDP Content-Length: XXX . . . m = message 5060 sip sip:A@microsoft.com . . .
B->D:	SIP/2.0 200 OK To: sip:B@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Require: multiparty Contact: sip:B@microsoft.com Content-Length: XXX . . . m = message 5060 sip sip:B@microsoft.com . . .
C->D:	SIP/2.0 200 OK To: sip:C@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 INVITE Require: multiparty Contact: sip:C@microsoft.com Content-Length: XXX . . . m = message 5060 sip sip:C@microsoft.com . . .
D->B:	ACK sip:B@microsoft.com SIP/2.0 To: sip:B@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 ACK Content-Length: 0

TABLE 4-continued

D->C:	ACK sip:C@microsoft.com SIP/2.0 To: sip:C@microsoft.com From: Participant D <sip:D@microsoft.com> Call-ID: 1234567890 CSeq: 1 ACK Content-Length: 0

Once Participant D **404***d* receives a SIP 200 OK response from Participant B **404***b* in reference to a join INVITE from Participant D **404***d*, media may begin to flow between Participant D **404***d* and Participant B **404***b* even though Participant D **404***d* may have outstanding INVITES to the other participants **404**. If one of the outstanding INVITES fails, then Participant B **404***b* will be notified that Participant D **404***d* is leaving the communications session **100**. Such an event is called a "flicker", because Participant B **404***b* observes Participant D **404***d* become available to the communications session **100** and then leave the communications session **100** within a short period of time.

Several safeguards exist for capturing errors within a communications session **100**, but are not necessarily an integral part of the present invention. If Participant D **404***d* is not online when "invited" by the session manager **401** to the communications session **100**, then the relevant registrar (i.e., the session manager **401**) associated with the "invite" will return a "480 Temporarily Unavailable" error message. If Participant D **404***d* does not wish to join the communications session **100**, then Participant D **404***d* will send a "603 Decline" error message to the session manager **401**. If Participant D **404***d* has blocked communications with the session manager **401**, then Participant D **404***d* will send a "480 Temporarily Unavailable" error message to the session manager **401**. If Participant D **404***d* receives an INVITE message from the session manager **401** for a communications session **100** before Participant C **404***c* leaves the communications session **100**, but Participant D **404***d* then tries to connect to Participant C **404***c* after Participant C **404***c* has left the communications session **100**, then Participant C **404***c* will return a "610 Session Not Known" error message to Participant D **404***d*. Participant D **404***d* will then assume that Participant C **404***c* is no longer part of the original communications session **100**. If Participant D **404***d* cannot successfully send an INVITE message to any other participant **404**, then Participant D **404***d* should not join the communications session **100** and should cancel all pending INVITES and disconnect any successful connections. Then, Participant D **404***d* should send a "BYE" SIP message to notify the session manager **401** that it could not join the communications session **100**.

One skilled in the art will recognize that the present invention may be implemented without the safeguards for capturing errors described above. Such safeguards add value to the present invention, but are not absolutely necessary for multiparty communications sessions **100**.

FIG. **12** displays a flowchart representation of a method **1200** of sending instant messages in a multiparty communications session **100** in accordance with an exemplary embodiment of the present invention. Instant messaging between multiple participants **404** requires a different reporting scheme for errors. Instead of reporting that a message has been received by one participant **404**, it should report if the message was received by all the participants **404**, otherwise an error should be generated. For purposes of FIG. **12**, Participant D **404***d* has successfully joined the communications session **100** with Participant A **404***a*, Participant B **404***b*, and Participant C **404***c*. Participant D **404***d* desires to send an instant message to all of the participants **404** within the communications session **100**, namely Participant A **404***a*, Participant B **404***b*, and Participant C **404***c*.

After starting at step **1201**, Participant D **404***d* proceeds to step **1204** of method **1200** where Participant D **404***d* sends a message to all media end points (i.e., all other participants **404**). Participant D **404***d* then proceeds to step **1207** where it yields until a response has been received from all media end points or a timeout period has expired. Next, at step **1210**, Participant D **404***d* determines whether all the media end points received the message, by evaluating responses from each of the media end points. If Participant D **404***d* determines that a media end point did not receive the message sent by Participant D **404***d*, then Participant D **404***d* terminates operation in accordance with method **1200** at step **1213**, due to the failure of the instant message from Participant D **404***d* to all media end points. Otherwise, if Participant D **404***d* determines that all of the media end points received the message, then Participant D **404***d* terminates operation in accordance with method **1200** at step **1216**.

One skilled in the art will recognize that alternative reporting schemes may be implemented within the spirit of the present invention. For example, and not limitation, instant messages may be sent to all connected parties and success and failure messages may be reported for all participants **404** as separate events.

FIGS. **13**A-**13**B display a flowchart representation of a method **1300** of designating a new communications session manager **401** in accordance with an exemplary embodiment of the present invention. When a user agent **107** determines that the communications session **100** no longer has a session manager **401** (i.e., the participant **404** acting as session manager exits the session) one of the existing user agents **107** must become the session manager **401**. To become the session manager **401** for the communications session **100**, a participant **404** must send an INFO message to all other participants **404** indicating that it wants to become the new session manager **401**. Once all of the other participants **404** acknowledge the request, then the requesting participant **404** sends a final INFO message to all other participants **404** stating that it has become the new session manager **401**. The two INFO messages are needed to provide a mechanism for election of the new session manager **401** if more than one participant **404** desires to be the session manager **401** of the current communications session **100**. When a participant **404** requests to be session manager **401**, a random number is generated and associated with the request. Thus, if two participants **404** want to be session manager **401** the participant **404** with the lower number will send an acceptance message to the other participant **404**, while the participant **404** with the higher number will send a decline to the other participant **404**. The participant **404** that receives acceptance from all other participants **404** may then send the second INFO message to all other participants **404** stating that it will become the session manager **401**. The INFO message contains source identification information that is used by the other participants **404** to mark a logical construct indicating that the source of the SETRM message is the session manager **401**. One skilled in the art will recognize that different bidding methods exist including, but not limited to, random number generation, comparison of interne protocol addresses, alphabetical comparison, or seniority (i.e., participant **404** connected to the communications session **100** for the longest period of time).

For the purposes of FIGS. **13**A-**13**B, Participant A **404***a* desires to be the session manager **401** of an existing communication session **100**, where Participant C **404***c* may also desire to be the session manager **401**. After starting at step

1301, Participant A 404*a* proceeds to step 1304 of method 1300 where Participant A 404*a* sends a REQUESTRM message to all other participants 404 within the communications session 100, when it is determined that a session manager 401 is needed. Participant A 404*a* then proceeds to step 1307 where Participant A 404*a* yields until a response is received from all other participants 404. Next, Participant A 404*a* advances to step 1310 once Participant A 404*a* receives all of the responses from the other participants 404. At step 1310, Participant A 404*a* determines whether any other participant 404 wishes to become session manager 401 by evaluating the responses from the other participants 404. If Participant A 404*a* determines that no other participant 404 wishes to become session manager 401 of the communication session 100, then Participant A 404*a* proceeds to step 1319 where Participant A 404*a* sends a SETRM message to all participants 404 within the communications session 100 indicating that it has become the session manager 401. Participant A then terminates operation in accordance with method 1300 at step 1322, due to the successful election of a session manager 401.

If, however, at step 1310, Participant A 404*a* determines that another participant 404 (i.e., Participant C 404*c*) wishes to be session manager 401, then Participant A 404*a* advances to step 1313 where Participant A 404*a* determines whether the bid value (i.e., random number) allows it to become the session manager 401, by comparing the bid value of Participant A 404*a* with the bid number of Participant C 404*c*. The bid value is generated and included in a REQUESTRM message when a participant 404 desires to become session manager 401. One skilled in the art will recognize that different techniques may be used to implement a bidding scheme. Such values may be random numbers, where the greatest number wins the bid. In a case where the bid numbers are the same, a tie-breaking mechanism may be developed (i.e., comparison of internet protocol addresses) and utilized to break the tie.

If Participant A 404*a* determines that Participant A's 404*a* bid value does not allow it to become the session manager 401, then Participant A 404*a* proceeds to step 1325 where Participant A 404*a* accepts Participants C's 404*c* request to be session manager 401, by sending a REQUESTRM response with ALLOW=YES to Participant C 404*c*. Participant A 404*a* then terminates operation in accordance with method 1300 at step 1328, due to the failure of Participant A's 404*a* election as session manager 401.

If at step 1313, Participant A 404*a* determines its bid value allows Participant A 404*a* to become the session manager 401, then Participant A 404*a* advances to step 1316 where Participant A 404*a* declines Participant C's 404*c* request to become session manager 401, by sending a REQUESTRM response with ALLOW=NO to Participant C 404*c*. Participant A 404*a* then proceeds to step 1319 of session 1300 where Participant A 404*a* sends a SETRM message to all participants 404 within the communications session 100 indicating that it has become the session manager 401. Participant A 404*a* ends operation in accordance with method 1300 at step 1322, due to the success of Participant A's 404*a* election as session manager 401.

Table 5 illustrates the call flow (i.e., using SIP) for Participant B 404*b* requesting to be session manager 401 where Participant C 404*c* accepts the request. If, however, Participant C 404*c* also wanted to be session manager 401, then Participant C 404*c* would set the "allow" attribute to "no" or "false" and at the same time send a REQUESTRM message to Participant B 404*b*. The participant 404 with the higher number would automatically be selected as the session manager 401 with the participant 404 with the lower number accepting the REQUESTRM message from the participant 404 with the higher number. Also, the participant 404 with the higher number would decline the REQUESTRM message from the participant 404 with the lower number. It should be noted that, the REQUESTRM and SETRM header fields are not part of the basic Session Initiation Protocol, but are instead part of a layer of functionality and structure provided by the present invention on top of the Session Initiation Protocol to assist in designating and electing a participant 404 as the session manager 401.

TABLE 5

B->C:	INFO C@microsoft.com To: sip:C@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 20 INFO Contact: sip:B@microsoft.com Content-Type: application/ms-mim Content-Length: XXX <action> <RequestRM uri = "sip:B@microsoft.com" bid = "1234"/> </action>
C->B:	SIP/2.0 200 OK To: sip:C@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 20 INFO Contact: sip:C@microsoft.com Content-Type: application/ms-mim Content-Length: XXX <action> <RequestRMResponse uri = "sip:B@microsoft.com" allow = "true"/> </action>
B->C:	INFO C@microsoft.com To: sip:C@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 21 INFO Contact: sip:B@microsoft.com Content-Type: application/ms-mim Content-Length: XXX <action> <SetRM uri = "sip:B@microsoft.com"/> </action>
C->B:	SIP/2.0 200 OK To: sip:C@microsoft.com From: Participant B <sip:B@microsoft.com> Call-ID: 1234567890 CSeq: 21 INFO Contact: sip:C@microsoft.com Content-Type: application/ms-mim Content-Length: XXX <action> <SetRMResponse uri = "sip:B@microsoft.com"/> </action>

Whereas the present invention has been described in detail it is understood that variations and modifications can be effected within the spirit and scope of the invention, as described herein before and as defined in the appended claims. The corresponding structures, materials, acts, and equivalents of all mean-plus-function elements, if any, in the claims below are intended to include any structure, material, or acts for performing the functions in combination with other claimed elements as specifically claimed.

What is claimed is:

1. A method of initiating and managing a multiparty communications session, the method comprising:

creating a communication link between a first participant and a second participant for the communication of media therebetween;

creating a communication link between the first participant and a third participant for the communication of media therebetween;

creating a communication link between the second participant and the third participant for the communication of media therebetween;

determining whether a characteristic associated with the first participant meets a predetermined criterion;

upon determining that the characteristic meets the predetermined criterion, designating the first participant as a session manager of the multiparty communications session for receiving all session management messages from participants in the multiparty communications session and for:

controlling the admission of an additional participant to the multiparty communications session;

responding to a participant exiting the multiparty communications session;

maintaining an authoritative list of participants in the multiparty communications session;

updating the authoritative list of participants in the multiparty communications session in response to participants joining and exiting the multiparty communications session; and

exclusively synchronizing the authoritative list of participants in the multiparty communications session with each of the participants in the multiparty communications session;

issuing, by the first participant, an invitation inviting the additional participant to join the multiparty communications session, wherein the invitation includes the authoritative list of participants in the multiparty communications session, the authoritative list of participants including at least the second and third participants; and

when the additional participant is admitted to the multiparty communications session, creating a communication link between the additional participant and the first participant for the communication of media therebetween, a communication link between the additional participant and the second participant for the communication of media therebetween, and a communication link between the additional participant and the third participant for the communication of media therebetween, so that the additional participant can communicate with the other participants without having to route the communication through the session manager,

wherein each participant is an end point for the bi-directional communication of media in the multiparty communications session,

wherein the additional participant uses the authoritative list of participants to join the multiparty communications session, by:

sending a message to each of at least the second and third participants;

receiving a successful response to the message from each of at least the second and third participants;

when the additional participant has received the successful response to the message from each of at least the second and third participants, sending a message to the first participant; and

creating a communication link between the additional participant and each of at least the second and third participants for the communication of media therebetween, and

wherein only the first participant that has been designated as the session manager of the multiparty communications session may issue the invitation inviting the additional participant to join the multiparty communications session.

2. The method of claim 1, further comprising, in response to the first participant exiting the multiparty communications session:

sending, by the second participant in the multiparty communications session, a first request to become a new session manager;

sending, by the third participant in the multiparty communications session, a second request to become a new session manager; and

based on the first and second requests, designating either the second participant or the third participant as the session manager.

3. The method of claim 1, wherein the method further comprises:

establishing a communication link between the first participant and the second participant for the communication of session management messages therebetween; and

establishing a communication link between the first participant and the third participant for the communication of session management messages therebetween.

4. The method of claim 1, wherein the method further comprises:

issuing, by the first participant, an invitation inviting the second participant to join the multiparty communications session;

receiving, by the second participant, the invitation from the first participant; and

issuing to the first participant, by the second participant, a response to the invitation.

5. The method of claim 4, wherein the invitation includes the authoritative list of participants in the multiparty communications session.

6. The method of claim wherein the method further comprises:

issuing, by the second participant, a request to invite the third participant to the multiparty communications session;

receiving, by the first participant, the request to invite from the second participant; and

issuing, by the first participant, an invitation inviting the third participant to the multiparty communications session.

7. The method of claim 1, further comprising:

receiving, by the session manager, a request from one of the participants in the multiparty communications session to invite a second additional participant;

inviting, by the session manager, the second additional participant to join the multiparty communications session;

determining, by the session manager, that the second additional participant does not support multiparty communications; and

establishing, by the session manager, a one-on-one communications session between the session manager and the second additional participant.

8. A method of managing a multiparty communications session, the method comprising:
creating a full-mesh of communication links for a first participant, a second participant, and a third participant for the multiparty communications session;
determining whether the first participant meets a session manager criterion,
after determining that the first participant meets the session manager criterion, designating the first participant in the multiparty communications session as a session manager of the multiparty communications system for;
receiving all session management messages from participants in the multiparty communications session;
exclusively maintaining an authoritative list of participants in the multiparty communications session;
exclusively controlling an admission of an additional participant to the multiparty communications session;
exclusively inviting the additional participant to join the multiparty communication session;
exclusively providing the authoritative list of participants to the additional participant, wherein the additional participant used the authoritative list of participants to join the multiparty communications session, by;
sending a message to each of at least the second and third participants;
receiving a successful response to the message from each of at least the second and third participants;
when the additional participant has received the successful response to the message from each of at least the second and third participants sending a message to the first participant; and
creating a communication link between the additional participant and each of at least the second and third participants for the communication of media therebetween; and
exclusively synchronizing the authoritative list of participants with the participants in the multiparty communications session to reflect the additional participant,
wherein not ail communications between participants in the multiparty communications session are routed through the session manager.

9. The method of claim 8, further comprising:
receiving from the second participant the multiparty communications session a request to invite the additional participant to the multiparty communications session; and
determining that the additional participant is not already participating in the multiparty communications session,
wherein the additional participant is invited to in the multiparty communications session in response to determining that the additional participant is not already participating in the multiparty communications session.

10. The method of claim 9, further comprising:
notifying the first participant that the additional participant accepted the invitation as indicated by the received successful response to join the multiparty communications session.

11. The method of claim 8, further comprising;
implementing a rule set for the multiparty communications session wherein the rule set includes at least one of a rule restricting access to the multiparty communications session, a rule limiting a duration of the multiparty communications session, and a rule limiting a number of participants in the multiparty communications session;
applying the rule set; and:
based upon the application of the rule set, determining that the additional participant is allowed to join the multiparty communications session.

12. The method of claim 8, further comprising:
determining that the second participant exited the multiparty communications session;
updating the authoritative list of participants in the multiparty communications session in response to the exit of the second participant; and
providing the updated authoritative list of participants to at least one remaining participant in the multiparty communications session.

13. The method of claim 8, further comprising: leaving, by the session manager, the multiparty communications session;
sending, by the second participant in the multiparty communications session, a first request to become a new session manager;
sending by the third participant in the multiparty communications session, a second request to become a new session manager; and
based on the flirt and second requests, designating either the second participant or the third participant as the new session manager.

14. The method of claim 8, further comprising:
receiving, by the session manager, a request from a participant in the multiparty communications session to invite a second additional participant;
inviting, by the session manager, the second additional participant to join the multiparty communications session;
determining, by the session manager, that the second additional participant does not support multiparty communications; and
establishing, by the session manager, a one-on-one communications session between the session manager and the second additional participant.

15. A method of managing multiparty communications session having multiple participants, the method comprising:
creating a full-mess of communication links for a first participant, a second participant, and a third participant for the multiparty communications session;
determining whether the first participant meets a session manager criterion;
after determining that the first participant meets the session manager criterion,
designating the first participant as a session manager of the multiparty communications session;
exclusively maintaining, by the session manager, an authoritative list of participants in the multiparty communications session;
exclusively inviting, by the session manager, an additional participant to join the multiparty communications session;
exclusively providing, by the session manager, the authoritative list of participants to the additional participant, wherein all additional participants joining the multiparty communications session obtain the authoritative list of participants from the session manager, such that the possibility of multiple participants receiving different lists of participants is reduced wherein the additional participants uses the authoritative list of participants to join the multiparty communications session, by;
sending a message to each of at least the second and third participants;

receiving a successful response to the message from each of at least the second and third participants;

when additional participant has received the successful response the message from each of at least the second and third participants, sending a message to the first participant; and

creating a communication link between the additional participant and each of at least the second and third participants for the communication of media therebetween;

exclusively receiving, by the session manager, an acceptance by the additional participant of the invitation to join the multiparty communications session;

after receiving, exclusively updating, by the session manager, the authoritative list of participants to include the additional participant; and

after updating, exclusively synchronizing, by the session manager, the authoritative list of participants with the other participants in the multiparty communications system to reflect the additional participant.

16. The method of claim **15**, further comprising:

leaving, by the session manager, the multiparty communications session;

sending, by the second participant in the multiparty communications session, a first request to become a new session manager;

sending, by the third participant in the multiparty communications session, a second request to become a new session manager; and

based on the first and second requests, designating either the second participant or the third participant as the new session manager.

17. The method of claim **15**, further comprising,

receiving, by the session manager, a request from one of the multiple participants in the multiparty communications session to invite a second additional participant;

inviting, by the session manager, the second additional participant to join the multiparty communications session;

determining, by the session manager, that the second addition participant does; not support multiparty communications; and

establishing, by the session manager, a one-on-one communications session between the session manager and the second additional participant.

18. The method of claim **15** wherein the session manager receives all session management calls in the multiparty communications session, such that the authoritative list of participants properly reflects the participants in the multiparty communications session.

19. The method of claim **15**, further comprising, prior to designating the one of the multiple participants in the multiparty communications session as the session manager, determining that a characteristic associated with the one of the multiple participants meets a predetermined criterion.

20. The method of claim **15**, further comprising:

implementing, by the session manager, a set of one or more rules for the multiparty communications session; and

determining, by the session manager, that the additional participant satisfies the set of one or more rules.

21. A computer-readable storage device encoded with computer-executable instructions for initiating and managing a multiparty communications session, by a method comprising:

creating a full-mesh of communication links for a first participant, a second participant, and a third participant for the multiparty communications session;

determining whether the first participant meets a session manager criterion;

upon determining that the first participant meets the session manager criterion, designating the first participant meets session manager of the multiparty communications session for;

exclusively maintaining and authoritative list of participants in the multiparty communications session;

exclusively updating the authoritative list of participants in the multiparty communications session in response to participants joining and exiting the multiparty communications session;

exclusively issuing an invitation inviting the additional participant to join the multiparty communications session, the invitation including the authoritative list of participants in the multiparty communications session so that the additional participant uses the authoritative list to establish communications links with at least the second participant and the third participant to effect a full-mesh of communication links for the first participant, the second participant, the third participant, and the additional participant by;

sending a message to each of at least the second and third participants;

receiving a successful response to the message from each of at least the second and third participants;

when the additional participant has received the successful response to the message from each of at least the second and third participants, sending a message to the first participant; and

creating a communication link between the additional participant and each of at least the second and third participants for the communication of media therebetween; and

exclusively synchronizing the authoritative list of participants in the multiparty communications session with each of the participants in the multiparty communications session to ensure that each participant has a synchronized copy of the authoritative list.

22. The computer-readable storage device of claim **21** wherein only the first participant that has been designated as the session manager of the multiparty communications session may issue the invitation inviting the additional participant to join the multiparty communications session.

23. The computer-readable storage device of claim **21** wherein the session manager ensures that participants join the multiparty communications session sequentially to reduce a possibility of disjointed communications.

24. The computer-readable storage device of claim **21** wherein the session manager receives invitation requests to add a participant to the multiparty communications session but does not process a received invitation request until all previously received invitation requests have been processed.

25. The computer-readable storage device of claim **24** wherein the processing of a received invitation request includes sending to the participant to be added the authoritative list of participants that includes participants added based on previously received invitation requests.

26. The computer-readable storage device of claim **21** wherein when the session manager exits the multiparty communications session and multiple participants request to be session manager, each of the multiple participants generates a random number and a new session manager is selected based on the generated random number.

27. The computer-readable storage device of claim **26** wherein the participant that generated the highest random number is selected as the new session manager.

28. The computer-readable storage device of claim **26** wherein the new session manager notifies the other participants of the new session manager.

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